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ABSTRACT

In an effort to determine female Navajo fertility histories, patterns of contraceptive use, educational levels, residence patterns, and modes of communication re: family planning, a five-part questionnaire (personal data, marital history, pregnancy history, knowledge of contraception, and comments on family planning) was administered to 42 women in LeChee, 34 in Red Lake, and 63 in South Tuba (the northwestern portion of the Navajo Reservation). Respondents were 18 years of age or older and they did not constitute a randomized sample. Results indicated: fertility had been and continued to be high, having fluctuated in the past with economic conditions but gradually declining; peak fertility was lower and occurred at younger ages than in the past; contraceptive use was as common among young women with few children as it was among older women with many children; desired family size among young women was declining but was still large; communication about the use of contraception appeared to be limited among women and between spouses (there was evidence of correlation between residence patterns and discussion of contraception); the majority favored improvement of existing family planning programs; older women felt family planning should be used primarily in the case of health jeopardy; younger women wanted more and better information than is currently available. (JC)

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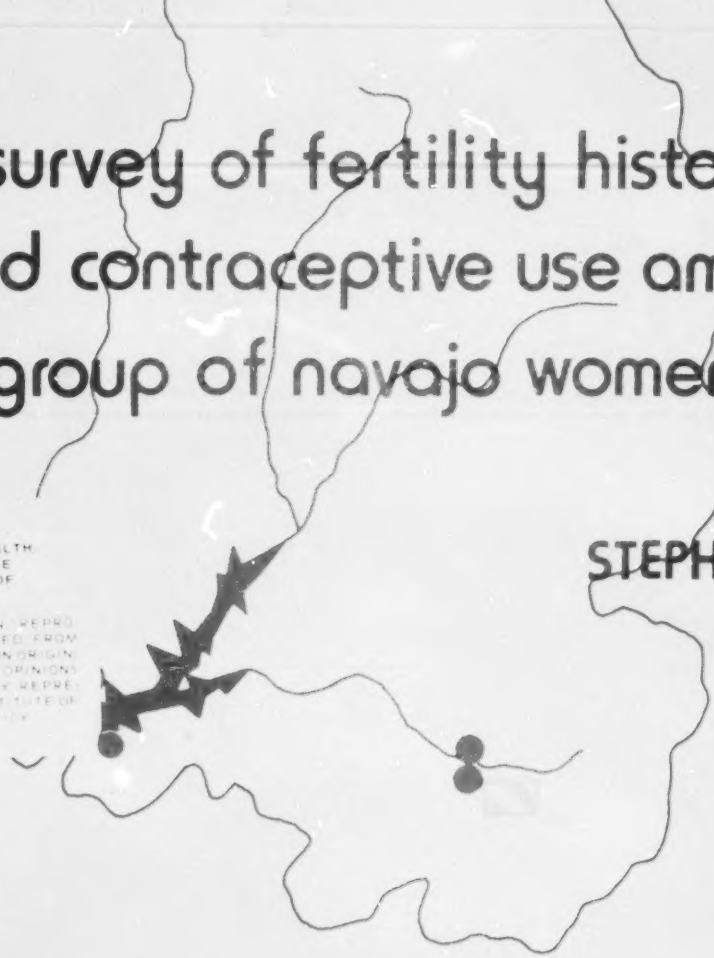

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LAKE POWELL RESEARCH PROJECT BULLETIN

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A SURVEY OF FERTILITY HISTORIES AND CONTRACEPTIVE USE AMONG A GROUP OF NAVAJO WOMEN

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June 1976

LAKE POWELL RESEARCH PROJECT

The Lake Powell Research Project (formally known as Collaborative Research on Assessment of Man's Activities in the Lake Powell Region) is a consortium of university groups funded by the Division of Advanced Environmental Research and Technology in RANN (Research Applied to National Needs) in the National Science Foundation.

Researchers in the consortium bring a wide range of expertise in natural and social sciences to bear on the general problem of the effects and ramifications of water resource management in the Lake Powell region. The region currently is experiencing converging demands for water and energy resource development, preservation of nationally unique scenic features, expansion of recreation facilities, and economic growth and modernization in previously isolated rural areas.

The Project comprises interdisciplinary studies centered on the following topics: (1) level and distribution of income and wealth generated by resources development; (2) institutional framework for environmental assessment and planning; (3) institutional decision-making and resource allocation; (4) implications for federal Indian policies of accelerated economic development of the Navajo Indian Reservation; (5) impact of development on demographic structure; (6) consumptive water use in the Upper Colorado River Basin; (7) prediction of future significant changes in the Lake Powell ecosystem; (8) recreational carrying capacity and utilization of the Glen Canyon National Recreational Area; (9) impact of energy development around Lake Powell; and (10) consequences of variability in the lake level of Lake Powell.

One of the major missions of RANN projects is to communicate research results directly to user groups of the region, which include government agencies, Native American Tribes, legislative bodies, and interested civic groups. The Lake Powell Research Project Bulletins are intended to make timely research results readily accessible to user Groups. The Bulletins supplement technical articles published by Project members in scholarly journals.

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ABSTRACT

This bulletin reports the results of a survey of 137 women living in the northwestern portion of the Navajo Reservation. These Navajo women, residing in Land Management Districts 1 and 3, were all 18 years of age or older at the time of the survey. Our analysis covers fertility histories, patterns of contraceptive use, educational levels, residence patterns, and modes of communication about family planning.

It was found that fertility among the Navajo women surveyed has been, and continues to be, high; that it has fluctuated in the past depending upon prevailing economic conditions; and that it is gradually declining at present. Peak fertility is lower and is occurring at younger ages than in the past. Our survey shows that contraceptive use is as common among young women with relatively few children as it is among older women with many children. Among young women, desired family size is declining but it is still large. Communication about the use of contraception appears to be very limited among women and between spouses. There is suggestive evidence that this tendency is related to residence patterns, in that women in extended residence groups are less likely to discuss contraception with their spouses than are women in neolocal households.

The majority of Navajo women interviewed favor the improvement of existing family planning programs. Older women in the sample, however, tend to think that family planning should be used primarily when the mother's health is in jeopardy. Younger women do not feel the same way, and in general they desire more and better information than is currently available to them.

A SURVEY OF FERTILITY HISTORIES AND CONTRACEPTIVE USE AMONG A GROUP OF NAVAJO WOMEN

PART 1: INTRODUCTION AND METHODS

Introduction

In previous publications of the Lake Powell Research Project, we have traced changes in Navajo fertility rates both over time and from one part of the Navajo Reservation to another. We have shown that fertility patterns at present are related to economic differences and to differences in mortality across the reservation. We have suggested that the eastern end of the reservation is, in general, more economically developed than is the western end. As a result, mortality and fertility rates are lower in the east, and the causes of mortality that are of increasing importance in the east are man-made and/or degenerative in origin. The more isolated and less economically developed western end of the reservation has a population that is at an earlier phase of the so-called epidemiologic and demographic transitions (Kunitz, in press).

The conclusions reported so far, however, are based upon aggregate figures for the entire population of a region. Hence, we run the risk of committing the ecological fallacy: inferring from group data the characteristics of individuals (Robinson, 1950). For that reason, and because our major focus of concern is the northwest portion of the reservation in the area close to Lake Powell, we elected to do a small field study in which fertility histories, attitudes, and practices regarding contraception, and variables concerning personal characteristics and family economics and organization could be related at the individual level of analysis. In Part 1 the methods of the field study and the problems encountered are described. Our findings are reported in succeeding sections.

Sampling

One aspect of the work of the Anthropology Subproject of the Lake Powell Research Project (LPRP) has been to interview families and individuals living in various areas on the northwestern portion of the Navajo Reservation in order to understand how their lives have or have not been influenced by the development of strip mining, power production, and other economic activities in the vicinity. Interviewing was carried out in 1972 and 1973 in various parts of Land Management Districts 1, 2, 3, 4, and 8. Districts 2, 4, and 8 included areas that were influenced to a greater or lesser degree by the strip mining on Black Mesa, which is confined primarily to District 4. Lack of personnel for interviewing, difficulty of transportation, and transiency of much of the population led us to omit these areas from the fertility study and to concentrate instead on the communities in Districts 1 and 3. The communities studied were Red Lake, Tuba City, and LeChee (Figure 1). Procedures of sampling and the problems encountered by the anthropologists have been described in detail by Callaway et al. (1976). In this paper we summarize the relevant background material for the three communities and then discuss more fully the fertility survey.

LeChee was chosen because it includes both the town of Page and a new chapter formed as a result of the movement of people to the Page area during the

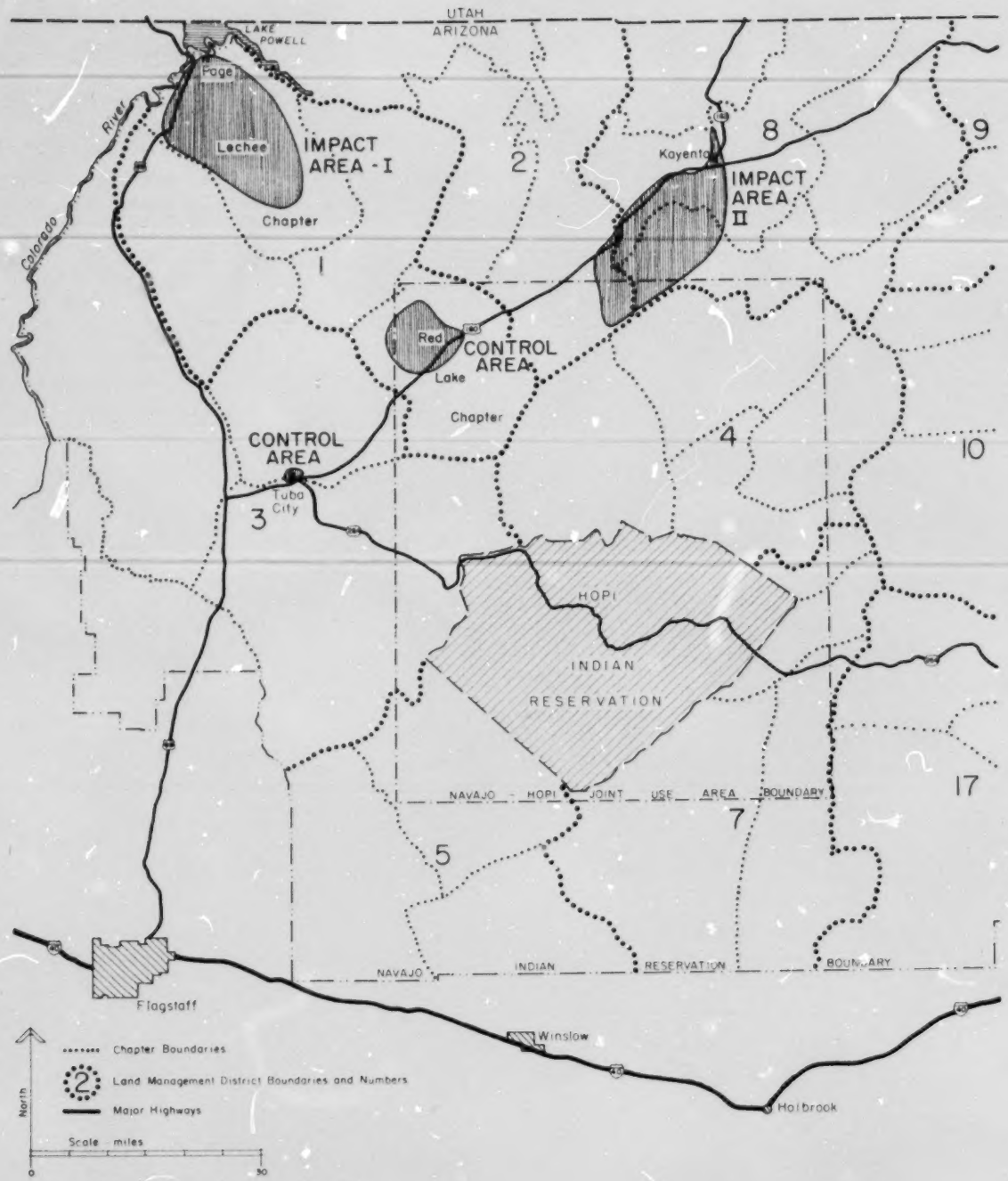

Figure 1: Western Portion of the Navajo Reservation Showing Areas Sampled. Map reproduced by permission from Callaway et al. (1976, p. 8, fig. 2)

construction of Glen Canyon Dam. It is thus an impact area to which many people have moved for jobs in power-related industries. Prior to these developments, it was a remote, sparsely settled area utilized for grazing by families from Kaibeto and Coppermine.

Initially, it was planned that an enumeration of Navajo households in Page and adjacent reservation areas would be made, followed by interviews of all, or a sample, of the households. For a variety of reasons (explained by Callaway et al., 1976) this was not done and instead the field worker interviewed what was essentially an availability sample. As a result, several subgroups were delineated: (1) people living along Route 89 to a distance 10 miles south of Page; (2) people living in trailer camps and shacks near the site of the Navajo Generating Station, which was at that time under construction; (3) people living in the town of Page itself; (4) people living in an area around the LeChee Chapter House, about 4 to 5 miles south of Page; (5) rural families living in the LeChee Grazing District; and (6) Navajo construction workers living either in a dormitory or in motels in the town of Page. Depending on the area, between one-third and one-half of the potential households were interviewed. As the sampling was on an availability basis, it is not clear what biases are built into the responses obtained.

The Red Lake-Tuba City populations were envisioned as controls. These were people in areas not directly influenced by either the strip mining on Black Mesa or the new developments associated with the construction of Glen Canyon Dam, the town of Page, or the Navajo Generating Station. Thus, changes occurring in these areas might provide some understanding of the processes of change of a more nonspecific nature. These communities were particularly attractive for study because baseline data had been collected by various members of the LPRP since the late 1950s (Levy, 1962a; Levy and Kunitz, 1974).

The original Red Lake population consisted of several related households and camps dependent primarily on subsistence livestock raising and chosen as representative of a rural and traditional population. It has been described in detail in previous publications (Levy, 1962a; Levy and Kunitz, 1974). In 1973, the 13 households remaining from this original sample were reinterviewed, along with 4 new households created by the marriage of children of the original families. In addition, a new sample was drawn from this area, which covers roughly 150 square miles. Its boundaries are as follows: from the Tonalea (Red Lake) Day School northwest to Wildcat Peak; from there north along White Mesa; and from White Mesa south to Cow Springs Trading Post. The southern boundary was Arizona State Highway 260 between Cow Springs Trading Post and the Tonalea Day School. This area was defined as a land use community, and an attempt was made to interview all households within it, including of course the original Red Lake sample. It is estimated that the anthropology field worker interviewed over 70 percent of the households.

A similar procedure was followed for the South Tuba sample, which was chosen as an example of a population living in a reservation-agency town. In the original studies from the late 1950s and early 1960s, maps had been made of all structures in South Tuba and a random sample analyzed. The group of 21 households in 13 camps in the original studies was reduced by 1973 to 15 households in 12

camps. The new sample was drawn by enumerating all existing structures in 1973 (approximately 268) and sampling every fourth one for addition to the original South Tuba sample. In contrast to Red Lake, where there were 8 refusals out of 68 interviews attempted (11.7 percent refusal rate), in South Tuba there were 46 refusals out of 104 interviews attempted (a refusal rate of 44 percent).

Interviewing for the fertility survey was done in the summer of 1973 in Red Lake and South Tuba, and in the summer of 1974 in LeChee. For several reasons, the results of the 1973 work were more complete than those of 1974. The interviewer employed in 1973 was related to many of the families in the sample. She had worked as an interviewer previously, had majored in anthropology in college, and was working in communities that were not highly factionalized. The interviewer during the summer of 1974 was not only living in a factionalized community and attempting to interview there, but she was herself a member of a dominant faction. Moreover, the interpreter for the anthropology field worker in 1973 in that area had been a member of another faction and for that reason, among others, the original sample was biased towards the faction of which she was a member. Thus, when our interviewer began work in 1974, she interviewed many women who were not from families interviewed in 1973. For a variety of reasons, it was not possible to rectify the situation.

The sample for the fertility survey was defined largely by the framework established by the LPRP anthropology field workers. It was our aim to interview all women 18 years of age and older in households where data had been gathered previously by the anthropologists. As it turned out, this sometimes meant that in Red Lake and South Tuba, interviews were obtained from women related to a household from which data had already been collected, but who were not themselves living in those households. In LeChee many of the women interviewed were not even from households related to those where previous anthropological interviews had been obtained. The total number of women interviewed was 137, and for some purposes we will present data for all of them. Of these, 95 were from households from which anthropological data had been gathered as well. Therefore, when we discuss the relationship of social organization and family economics to fertility beliefs and behaviors, we will do so only with regard to this subsample of women.

In Red Lake and South Tuba, the refusal rate was less than 5 percent. In LeChee it was closer to 40 percent. In all, 42 women were interviewed in LeChee, 32 in Red Lake, and 63 in South Tuba. The smaller number in Red Lake compared to the number interviewed by the anthropology field worker is due to the fact that our interviewing was prematurely terminated when our interviewer got married. Clearly, we do not have a random sample of women from Districts 1 and 3, much less from the total reservation. Moreover, the information collected is not complete for all of these women. Primarily these deficiencies are due to the reluctance of our interviewer in LeChee to ask women about their current contraceptive practices. In Red Lake and South Tuba there was no such problem.

Though readers may criticize us, and rightly so, for not having obtained proper random samples, we believe that we are justified in proceeding even on the basis of what must inevitably be considered biased

data. First, the problems of sampling in an area that was until recently largely unmapped are formidable. Second, in many areas, roads where they exist at all are often impassable. Third, distances are great, and therefore some interviews in the Red Lake area required a drive of 50 miles one way. As there are no telephones, it is virtually impossible to make appointments, and as people were often not at home when the interviewer arrived, callbacks were very difficult. The problem was less serious in South Tuba where virtually every household was within walking distance. Finally, in a factionalized community such as LeChee, it is very difficult to work with all factions, particularly when one does not have a highly skilled interviewer from outside the community who is not considered to be allied to either segment. We could not obtain the services of such an individual, although we made great efforts to do so. Thus, while we admit that we do not have a truly adequate sample, we believe that much of our information is valuable nonetheless. If conclusions are cautiously drawn from the data, something may be learned despite the numerous problems and deficiencies.

The Questionnaire and Its Analysis

Our questionnaire is presented in Appendix I. The first items supply identifying information to allow the integration of the fertility interview into the data set of the LPRP Anthropology Subproject. The second series of items request personal data.

The next series of questions relating to marital history are of obvious importance. We are interested primarily in whether changes in age at first marriage indicate postponement of marriage, and whether they are in any way related to changes in fertility over time. We include common-law and consensual unions within the category of marriage, as well as those marriages for which a ceremony was performed.

Section III of the questionnaire, the pregnancy history, is of major significance and was completed for every informant, even if contraceptive use and beliefs were not covered later in the interview. The form of the history is taken from one suggested by Bogue (1965), and it permits a variety of analyses, as described below.

In a population such as the Navajo in which until recently illiteracy has been high and hospital births rare, and for which birth certificates and precise dates of birth have therefore not been accurately recorded, there are major problems of recall and adequacy of data. Fortunately, the Bureau of Indian Affairs (BIA) and now the Navajo Tribe have issued to families census cards that record the name and birth date of each child. Using these cards as a framework, it is possible to obtain a listing of all children and then to inquire about any pregnancies or births that may have occurred that are not recorded. When, for instance, there was an interval of 2 or more years reported between recorded births, the interviewers were instructed to inquire about any pregnancy events that might explain the gap. Clearly, the older the respondent, the more likely it was that the dates on the census card would be inaccurate, and that pregnancies terminated within the first or second trimester would not be precisely recalled.

Each pregnancy event was coded on a separate sheet along with relevant

information such as the mother's age at that pregnancy and her date of birth. The variables recorded for each pregnancy require relatively little discussion. Date of birth or pregnancy loss was problematic, as noted above, and occasionally only the year could be ascertained rather than the month and day. Moreover, the report for the month during which the pregnancy was lost was also problematic, and is not regarded as valid.

The single most significant analysis of this part of the questionnaire is that reported in Part 3, in which we present age-specific pregnancy rates. These are calculated from the pregnancy code sheets in the following manner. First, the number of pregnancies in each calendar year to women at each age or in each age group (e.g., 15-19, 20-24 years) are tabulated. Then the number of woman-years at risk of becoming pregnant in each calendar year are calculated for women at each age. For instance, if two women reached age 15 on January 1, 1960, then there are 2 woman-years at risk for 15-year-olds in 1960. In reality, of course, the calculations are more complicated because women have birthdays throughout the year. If one woman had turned 15 on January 1, 1960, and the other on July 1, 1960, there would have been 1.5 woman-years at risk. The additional half year at age 15 for the second woman would have been counted in 1961. Because of the uncertainty surrounding the birth dates of some of the older women and due to the relatively small sample size, we have presented the calculations in 5-year intervals and in 5-year age groups: e.g., woman-years at risk for women aged 15-19 in 1930-34. When birth date was uncertain, a woman was said to have been born on January 1 of the year in which she said she was born. In retrospect, it might have been more sensible to choose July 1, but in any event, the number of women with uncertain birth dates was very small and it is not thought to create much inaccuracy in the computations.

Finally, after the number of pregnancies and the woman-years at risk were determined, a pregnancy rate was calculated by dividing the former number by the latter. This gives the number of pregnancies per woman-year at risk for women in various age groups. When this number is multiplied by 100, we obtain the number of pregnancies per 100 woman-years at risk, or an age-specific pregnancy rate per 100 woman-years at risk. The data are displayed in Appendix II and are discussed in Part 3.

We should point out that the number of women in each 5-year age group within each 5-year interval (for instance, 1925-1929) is not constant. A woman who became 15 on January 1, 1927, would have spent 3 years in the cohort which was 15-19 in 1925-29, and 2 years in the 15-19 cohort in 1930-34. The concept of woman-years at risk deals with such cases by counting within a particular time interval only the years a woman was in the age group under discussion.

Section IV of the questionnaire concerns knowledge and use of contraception as well as patterns of influence regarding contraceptive use. It would have been most ideal to have had much more intensive interviewing done than we were able to arrange. It would also have been desirable to have included interviews of husbands, boyfriends, and other relatives in order to gather information of the kind discussed by Rainwater (1965) and Hill et al. (1959). Given our limited resources, however, we could only accomplish the brief survey reported here. In fact we

were told that even this effort was foolhardy as Navajos are reputedly unwilling to discuss matters of a sexual nature. As in our survey of family-planning users on the eastern end of the reservation, however, we found in this northwestern area that when the interviewers felt comfortable when discussing these matters, most respondents were more than willing to talk to them quite frankly and indeed were often pleased to have the opportunity to confide in someone (Slocumb et al., 1975).

The questions in Section IV are relatively self-explanatory. We were interested in learning about what methods our respondents had used in the past and/or were using at the time of interview; from whom they had first learned of the various methods; how they had been influenced by, and had influenced, others; and what their notions were concerning ideal family size. In regard to patterns of influence, we asked about attitudes of the informant's mother and mother's sisters, because traditionally among Navajos such figures exert considerable influence in many areas, including those related to health (Levy, 1962b). We thought that perhaps similar influence would be exerted in the realm of family planning.

We asked for opinions about ideal family size in several ways: by questions concerning an informant's own family; concerning all Navajo families; and concerning an informant's advice to a daughter. Other observers have noted that informants frequently give the number of children they in fact already have as the ideal for their own families. By asking about other families than the respondent's own, we hoped to obtain a more accurate appraisal of what Navajos really believe to be the most ideal family size.

Finally, Section V of the questionnaire deals briefly with suggestions our informants might have cared to offer concerning the possible improvement of family-planning services. While the survey was not primarily intended to serve the purpose of improving family-planning programs, it was thought that some suggestions might be forthcoming that would perhaps be useful to the providers of health care on the Navajo Reservation. The responses were helpful in revealing some attitudes that are important, and those are briefly described in Part 5.

In summary, the field survey was carried out in order to assess the degree to which some of the variables thought to be important from our ecological analysis in fact were significant for individuals. The problems encountered are considerable, however; they arise from biases in sampling and interviewing and the inability to gather as complete data as would have been desirable.

PART 2: THE SETTING AND THE SAMPLE

Introduction

In Part 1 we described the sampling procedure, the questionnaire, and the problems we encountered. This section describes (1) the differences between the populations in each sample area as determined from the anthropological interviews; (2) the characteristics of the 137 women interviewed in the fertility survey and the subset of 95 women in the households for which anthropological data were available; and (3) the differences and similarities between households in which fertility and anthropological surveys were completed (N = 82) and those where only the anthropological interviews were completed.

The Three Sample Areas

As noted in the preceding section, the three areas in which both anthropological and fertility surveys were made were chosen to represent (1) an area influenced directly by the growth of energy-related industry (the Page-LeChee area); (2) a transitional reservation community that has been in existence for some time, is a center of wagework on the western end of the reservation, and has been on the whole uninfluenced by the developments in the Page-LeChee area (South Tuba); and (3) a more traditional area in which the population is dependent largely on welfare, occasional wagework, and the traditional pastoral economy (Red Lake). It was hoped that the latter two areas would serve as controls in attempting to assess the impact of economic development resulting from the activities in the Lake Powell region, because these two areas had been subjected to changes of a much more non-specific nature. The reader is referred for further information to detailed descriptions and comparisons of each area that have been published recently (Callaway et al., 1976).

Tables 1, 2, and 3 present data on households in each of the three areas. In each table, moreover, there is a comparision between those households where fertility interviews were carried out and those where there were no such interviews. Thus, by looking at the row labeled "total" under each sample area, one may compare all areas; by looking at the rows within each area labeled "interviewed" and "not interviewed," one may compare the households in which a fertility interview was held with those where they were not held. As stated above, 95 women in the fertility survey lived in households where anthropological data had been gathered as well. In these tables, the total in the interviewed categories is 82. This is because we are comparing households rather than individuals in these tables, and the 95 women lived in 82 households. Data relating directly to these 95 individuals will be given in the following section. (We have used the term household several times already and will have occasion to refer to it and the notion of camps again below. A certain amount of ambiguity appears in the anthropological literature concerning the use of the terms household and camp. The reader is urged to refer to the Glossary for definition of these and other terms used in the present paper.)

In Table 1 the distribution of camp types is displayed for each household. Notice that in the LeChee area, 65.5 percent of households are in neolocal camps--that is, they are single-household camps. In South Tuba the proportion is 45.6 percent and in Red Lake it is 33.9 percent. There are not substantial differences within each area between the households where fertility interviews were and were not carried out.

Table 2 indicates the proportion of income derived from wagework for households in each sample area. Not surprisingly, 80 percent of LeChee households derive over 75 percent of their income from wages, whereas 31.6 percent of South Tuba households and 12.5 percent of Red Lake households are in the same category. Conversely, 44 percent of Red Lake households have no income derived from wagework, whereas 35 percent of South Tuba households and only 1.8 percent of LeChee households are in that category. With the exception of South Tuba households with no earned income, there are no differences between households where fertility

Table 1: Camp Composition by Household

Sample Area	Neolocal		Matrilocal		Other Extended		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
LeChee								
Interviewed	12	75.0	2	12.5	2	12.5	16	100
Not interviewed	60	63.8	19	20.2	15	15.9	94	99.9
Total	72	65.5	21	19.0	17	15.5	110	100
Red Lake								
Interviewed	8	29.6	5	18.5	14	51.8	27	99.9
Not interviewed	11	37.6	3	10.3	15	51.7	29	99.9
Total	19	33.9	8	14.3	29	51.8	26	100
South Tuba								
Interviewed	19	48.7	16	41.0	4	10.2	39	99.9
Not interviewed	7	38.9	4	22.2	7	38.9	18	100
Total	26	45.6	20	35.1	11	19.3	57	100

interviews were and were not held. Even the South Tuba discrepancy is not really very large, particularly when the categories of 0 percent and 1-24 percent are combined.

Per capita income for households in the different areas is shown in Table 3. Not surprisingly, the same gradient is evident as in the previous table. Seventy-four percent of LeChee households have a per capita income of $1,300 or more a year, as do 28 percent of South Tuba households and 19.6 percent of Red Lake households. Once again there are no major differences between households where fertility interviews were and were not carried out.

The Interviewees

We have pointed out that of the 137 women interviewed, 95 lived in 82 households (briefly described above) for which anthropological data were also available. In this section the 95 women and the total group of 137 are described in more detail.

The subset of 95 women for whom both anthropological and fertility data are available are distributed unevenly among the three areas. Sixteen (16.8 percent) live in the LeChee area; 31 (32.6 percent) live in Red Lake; and 48 (50.5 percent) live in South Tuba. Not surprisingly, the distribution of camp types is essentially the same for the 95 women as for the 82 households from which they come. We had thought that perhaps there would be a difference, however, in terms of age, in that younger women would be more likely to live in neolocal households. Table 4 displays the relevant data, and it is evident that there is no significant difference between age groups.

Turning now to the total group of women interviewed (N = 137), we notice first that the age distribution (Table 5)

Table 2: Proportion of Total Income Derived from Wages by Household

Sample Group	Percent of Income Earned									
	0		1-24		25-74		75-100		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
LeChee										
Interviewed	0	0	1	6.3	2	12.5	13	81.2	16	100
Not interviewed	2	2.1	1	1.1	16	17.0	77	79.8	96	100
Total	2	1.8	2	1.8	18	16.1	90	80.3	112	100
Red Lake										
Interviewed	11	40.7	5	18.5	7	25.9	4	14.8	27	99.9
Not interviewed	14	48.3	6	20.7	6	20.7	3	10.3	29	100
Total	25	44.6	11	19.6	13	23.2	7	12.5	56	99.9
South Tuba										
Interviewed	11	28.2	7	17.9	8	20.5	13	33.3	39	99.9
Not interviewed	9	50.0	0	0	4	22.2	5	27.8	18	100
Total	20	35.1	7	12.3	12	21.0	18	31.6	57	100

Table 3: Per Capita Income by Household[a]

Sample Group	Per Capita Income (in dollars)												Total	
	200-500		501-700		701-900		901-1100		1101-1300		>1300			
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
LeChee														
Interviewed	0	0	3	18.8	1	6.3	2	12.5	0	0	10	62.5	16	100.1
Not interviewed	4	4.3	6	6.5	2	2.1	4	4.3	6	6.5	71	76.3	93	100
Total	4	3.7	9	8.2	3	2.8	6	5.5	6	5.5	81	74.3	109	100
Red Lake														
Interviewed	5	18.5	6	22.2	5	18.5	4	14.8	2	7.4	5	18.5	27	99.9
Not interviewed	3	10.3	9	31.0	4	13.8	5	17.2	2	6.9	6	20.7	29	99.9
Total	8	14.3	15	26.8	9	16.1	9	16.1	4	7.1	11	19.6	56	100
South Tuba														
Interviewed	5	12.8	8	20.5	8	20.5	3	7.7	4	10.3	11	28.2	39	100
Not interviewed	6	33.3	2	11.1	3	16.7	0	0	2	11.1	5	27.8	18	100
Total	11	19.3	10	17.5	11	19.3	3	5.3	6	10.5	16	28.1	57	100

[a] # = number, % = percent

Table 4: Camp Composition for 95 Women by Age[a]

Age (years)	Neolocal		Matrilocal		Other Extended		Total
	Number	Percent	Number	Percent	Number	Percent	Number
<30	9	36	7	28	9	36	25
30-49	25	54.3	11	23.9	10	21.8	46
>50	9	39.1	7	30.4	7	30.4	23
Unknown	--	--	--	--	1	--	1
Total	43	45.3	25	26.3	27	28.4	95

[a] $X_2^2 = 2.69$ (Matrilocal and extended combined); $p > .05$

Table 5: Age of Women Interviewed

Age (years)	Age Distribution							
	LeChee		Red Lake		South Tuba		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
15-19	1	2.4	1	3.2	3	4.9	5	3.7
20-24	7	16.7 (42.9)	2	6.5 (16.5)	12	19.7 (36.1)	21	15.7 (33.6)
25-29	10	23.8	2	6.5	7	11.5	19	14.2
30-34	9	21.4 (38.0)	9	29.0 (32.2)	5	8.2 (24.6)	23	17.2 (30.6)
35-39	7	16.6	1	3.2	10	16.4	18	13.4
40-44	4	9.5 (11.9)	4	12.9 (19.4)	6	9.8 (18.0)	14	10.4 (16.4)
45-49	1	2.4	2	6.5	5	8.2	8	6.0
50-54	1	2.4	3	9.7	6	9.8	10	7.5
55-59	1	2.4 (7.2)	1	3.2 (32.3)	3	4.9 (21.3)	5	3.7 (19.4)
60-64	1	2.4	2	6.5	2	3.3	5	3.7
>65	0	0	4	12.9	2	3.3	6	4.5
Total	42	100	31	100.1	61	100	134	100

varies considerably between areas. LeChee has the youngest population, South Tuba is is next, and Red Lake has the oldest population.

In Table 6 we have summarized the educational attainments of the interviewed women. Even controlling for age, there is a tendency for educational level to be ranked (in order from high to low) from LeChee to South Tuba to Red Lake. This pattern of education is not observed among women above the age of 50, however.

Despite the fact that there are marked differences in the proportion of income derived from wagework between the three areas, there are no significant differences in each area in the proportions of women who are wageworkers. Of the total group, 11.9 percent are employed. This result implies that it is primarily the men who are engaged in the wage economy.

There are differences in marital status among women in the different areas as well. Table 7 shows the data for each area by age. The number of women below the age of 30 in Red Lake is too low to give us much confidence in the validity of the proportion, but we note a significant difference between women in LeChee and in South Tuba, with a higher proportion married in the former area. For women aged 30-49, there is a significant difference between the three areas. There is a higher proportion married in LeChee than in Red Lake, and a higher proportion in Red Lake than in South Tuba.

It is clear that the areas from which the interviewed women come differ in some consistent ways. LeChee has the highest proportion of neolocal households with the greatest dependence on wagework and the highest per capita incomes. Educational attainment there is highest, and those women who live in the area are almost all

Table 6: Education of Women in Each Area

Age (years)	LeChee		Red Lake		South Tuba		Kruskal-Wallis Analysis of Variance[b]	
	Average Years	N[a]	Average Years	N	Average Years	N	H	P
<30	11.9	18	8.0	5	10.9	22	5.99	<0.05
30-49	7.3	21	2.4	16	4.6	26	10.05	<0.01
>50	3.0	3	2.0	9	5.5	13	3.16	>0.05
Total		42		30		61		

[a] N = Number in sample

[b] See glossary for explanation

Table 7: Percent of Women Married

Age (years)	LeChee		Red Lake		South Tuba	
	Number	Percent	Number	Percent	Number	Percent
<30	15	83.3	3	60.0	17	73.9
30-39	15	93.8	9	90.0	11	73.3
	20	95.2	13	81.3	16	61.5
40-49	5	100	4	66.6	5	45.5
>50	2	66.6	7	63.6	8	57.1
Total	37	88.1	23	71.9	41	65.1

married but are not necessarily themselves wageworkers. Red Lake is at the other end of the spectrum; it has the highest proportion of households organized in camps, the lowest per capita income, and the lowest involvement in wagework. As a result of a lack of wagework opportunities there, young people have emigrated and the population resembles other rural U.S. populations, in that it has a preponderance of older individuals. Among the young people who stay, there is a tendency for educational attainment to be lower than it is for young people in wagework communities. Thus, areas like Red Lake seem to be places where residual populations remain. If sufficient young people stay in these communities to maintain replacement levels, while the excess numbers move elsewhere, they may well remain foci of traditionalism where dependence on the subsistence economy supported by welfare will persist. South Tuba is generally intermediate between the two extremes described above.

Summary and Conclusions

We have described the three areas in which our work was done, as well as some of the characteristics of the households and respondents. Red Lake is most dependent upon non-wage sources of income, LeChee is least, and South Tuba is intermediate. LeChee has a younger and better educated population, with higher incomes and more neolocally organized families than the other areas. Again South Tuba appears to be intermediate and Red Lake is at the opposite end of the spectrum.

PART 3: CHANGING PATTERNS OF FERTILITY

Introduction

Our previously published review of existing data has suggested that the birth rate among Navajos has been declining gradually since the period following World War II (Kunitz, 1973). In this section, changing patterns of fertility are described as we have reconstructed them from our interviews. First, however, it is important to note some sources of bias in the material.

Sources of Bias

We have emphasized the limitations of our sampling procedures. In order to

assess the degree to which these limitations may have distorted our results, we have applied the age-specific birth rates from the Tuba City Agency in fiscal years 1971-72 to the corresponding age groups in our sample, and we have computed the expected number of live births to compare to the observed number of pregnancies (Kunitz, 1973). Strictly speaking, of course, live births and pregnancies are not equivalent. Among women in our sample delivering in 1970-74, however, the number of pregnancies that did not result in live births was vanishingly small and is not a major source of error.

Age-specific birth rates for the Tuba City Agency were calculated on the basis of live births per 1,000 women in each group per year: in other words, births per 1,000 woman-years. For the interview sample, the calculation was similar: births per woman-year at risk. Appendix II shows the data on which our computations are based. Table II-1 of Appendix II shows the number of woman-years in each age group for each 5-year period through 1970-74; Table II-2 shows the number of pregnancies; and Table III-3 shows the rate of pregnancies per woman-year at risk. Multiplying the rate by 100 gives a rate per 100 woman-years at risk and multiplying by 1,000 gives pregnancies per 1,000 woman-years. Thus, it is possible to compare the rates derived from the Indian Health Service hospital records with those provided by our interviews. The computations and the observed and expected number of births in our sample are displayed in Table 8.

Notice that in the interviewed sample there is a much higher than expected number of pregnancies in the age groups 15-19,

Table 8: Observed and Expected Pregnancy Rates for 137 Navajo Women

Age (years)	1971-72 Average Tuba City Agency Female Population	Average Yearly Number Live Births 1971-72 Tuba City Agency	Average Yearly Birth Rate Per 1000 Population	Women Years at Risk 1970-74 Sample	Expected Number Live Births	Observed Number Pregnancies
10-14	1,765	0	0	0	0	0
15-19	1,455	76	52	46	2.4	11
20-24	1,137	222	195	112	21.8	37
25-29	908	152	167	93	15.5	30
30-34	806	114	141	118	16.6	21
35-39	646	80	123	97	11.9	11
40-44	530	26	49	46	2.2	4
45-49	392	16	40	42	1.6	4
50-54	285	3	10	50	0.5	0

Table 9: Age at First Marriage

Age at Time of Interview (years)	Ever Married		Never Married	Unknown	Average Age At First Marriage	
	Number	Percent	Number	Number	Ever Married	All Women
15-29	39	82.9	7	1	19.3	16.0
30-39	38	92.7	1	2	19.4	18.0
40-49	21	95.5	1	0	20.3	19.3
>50	27	100	0	0	18.8	18.8
Total	125	91.2	9	3		

20-24, 25-29. Beyond the age of 30, the expected and observed numbers do not differ substantially. Thus, we have some reason to believe chat our interview data, particularly for younger women, are not as representative of the population of the western end as we may have desired. Our conclusions, therefore, must be made with caution.

Age at First Marriage and at First Pregnancy

It has commonly been noted that Navajo women have married early and have begun their childbearing early. In Table 9, the mean (average) age at first marriage for women in various age groups is displayed. The data are provided for all women and for those who have ever been married. Because a number of younger informants had not been at risk of marriage for very long at the time of interview, the mean for all women in the age group below 30 is much lower than in the older groups. As many of them are likely to marry in the future, the average will rise.

Notice that among women married at least once, the only really noteworthy deviation is among those in the 40-49 age group who married a year later on the average than women in both older and younger groups. This pattern reflects the period 20 to 30 years ago during the decade of the 1940s and early 1950s, when many men may have been absent in wartime, causing delayed marriages.

Age at first pregnancy does not show as much variation as does age at marriage. The results displayed in Table 10 suggest that, while marriages may have been postponed in the 1940s, this did not influence age at first pregnancy to any marked degree, though some slight increase is noted.

Personal characteristics are evidently related to both age at first marriage and first pregnancy. Partial correlations (see Glossary for explanation) controlling for age between each variable and education are as follows: with first marriage, $r = .23$ ($N = 114$, $p = .017$); with first pregnancy, $r = .23$ ($N = 114$,

Table 10: Age at First Pregnancy

Age at Time of Interview (years)	Ever Pregnant		Never Pregnant	Unknown	Average Age at First Pregnancy	
	Number	Percent	Number	Number	Ever Pregnant	All Women
15-29	45	95.7	2	0	19.9	19.0
30-39	38	92.7	3	0	20.3	18.8
40-49	21	95.4	1	0	20.7	19.7
>50	26	96.3	0	1	20.3	20.3
Total	130	94.9	6	1		

$p = .017$). Thus within age groups, higher education is significantly related to later age of both first marriage and first pregnancy, and it seems reasonable to suggest that as more people stay in school longer, significant changes will occur in the future. As yet, however, general educational attainment among Navajos is still low enough that there have been no really dramatic changes in either parameter.

Finally, it is noteworthy that of the women below age 30, 96 percent have been pregnant but only 83 percent are currently married. Lest the reader jump to the conclusion that this demonstrates an increasing rate of pregnancies out of wedlock, it must be pointed out that the older cohorts may have had the same pattern when they were younger and have simply had more opportunity to marry after the out-of-wedlock pregnancy.

Age-Specific Pregnancy Events

In Part 1 we have described the questionnaire by which the pregnancy histories were collected and the calculations required for deriving age-specific rates. The data are presented in Appendix II. Figures 2 and 3 show the data graphically.

Figure 2 represents simply the crude pregnancy rate in 5-year intervals from 1920 to 1974. Notice the declines in the 1930s and early 1940s reflecting the impact of stock reduction, the Depression, and World War II. Notice also the rebound--or baby boom--immediately after the war and then the subsequent decline during the 1950s. This decline probably reflects several factors operating at once: (1) increasing wagework; (2) decreasing productivity of the range (Aberle, 1966:83); and (3) decreasing infant mortality. Perhaps it may also reflect increasing educational levels. The slight increase in the 1960-64 period is hard to explain from these data alone, and we postpone discussion of this increase to a later section. Since the early 1960s, the curve has shown a marked negative slope, presumably a result of the increasing availability and effective use of contraceptive methods.

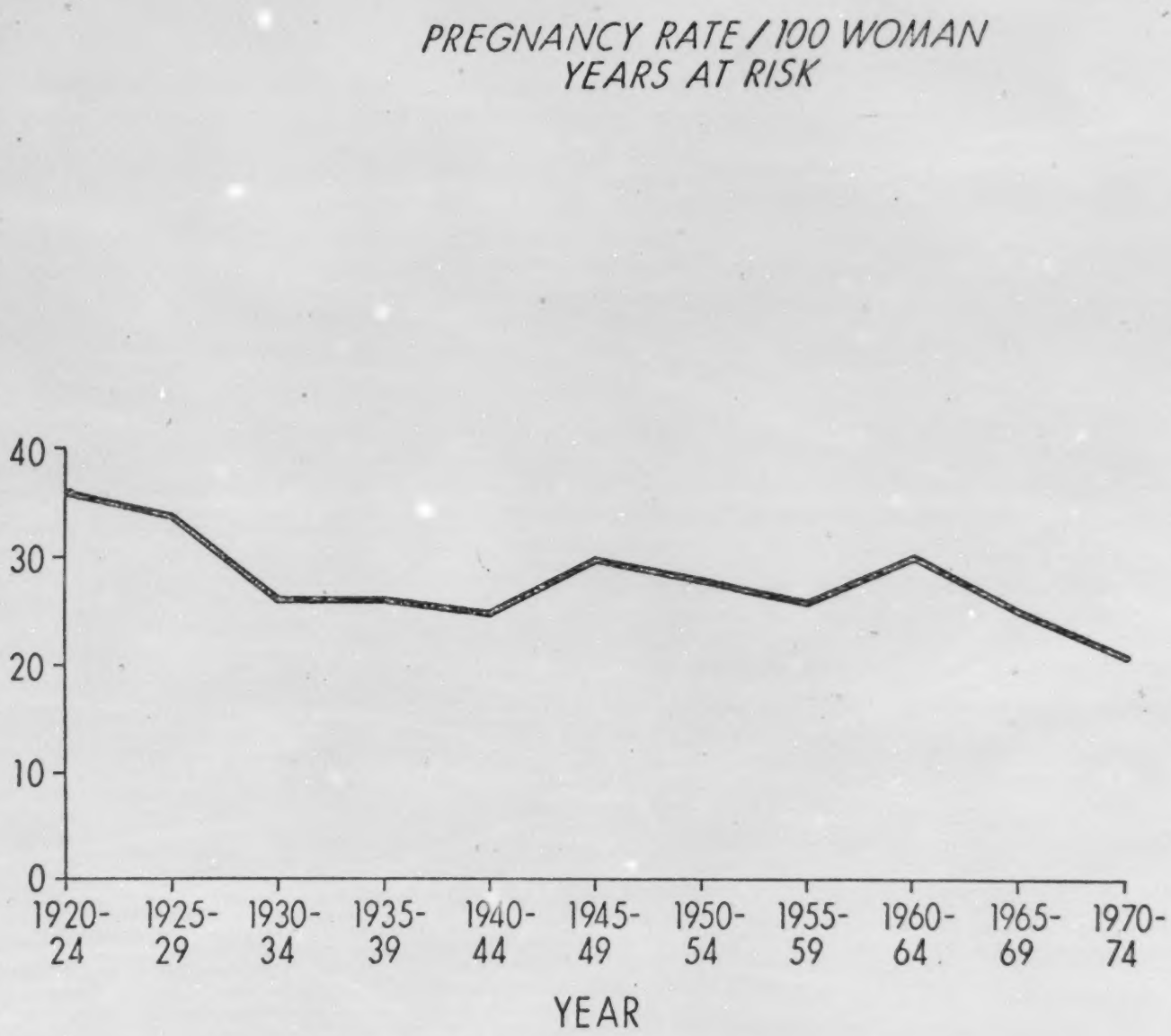

Figure 2: Total Pregnancy Rate per 100 Woman-Years at Risk, 1920-1974

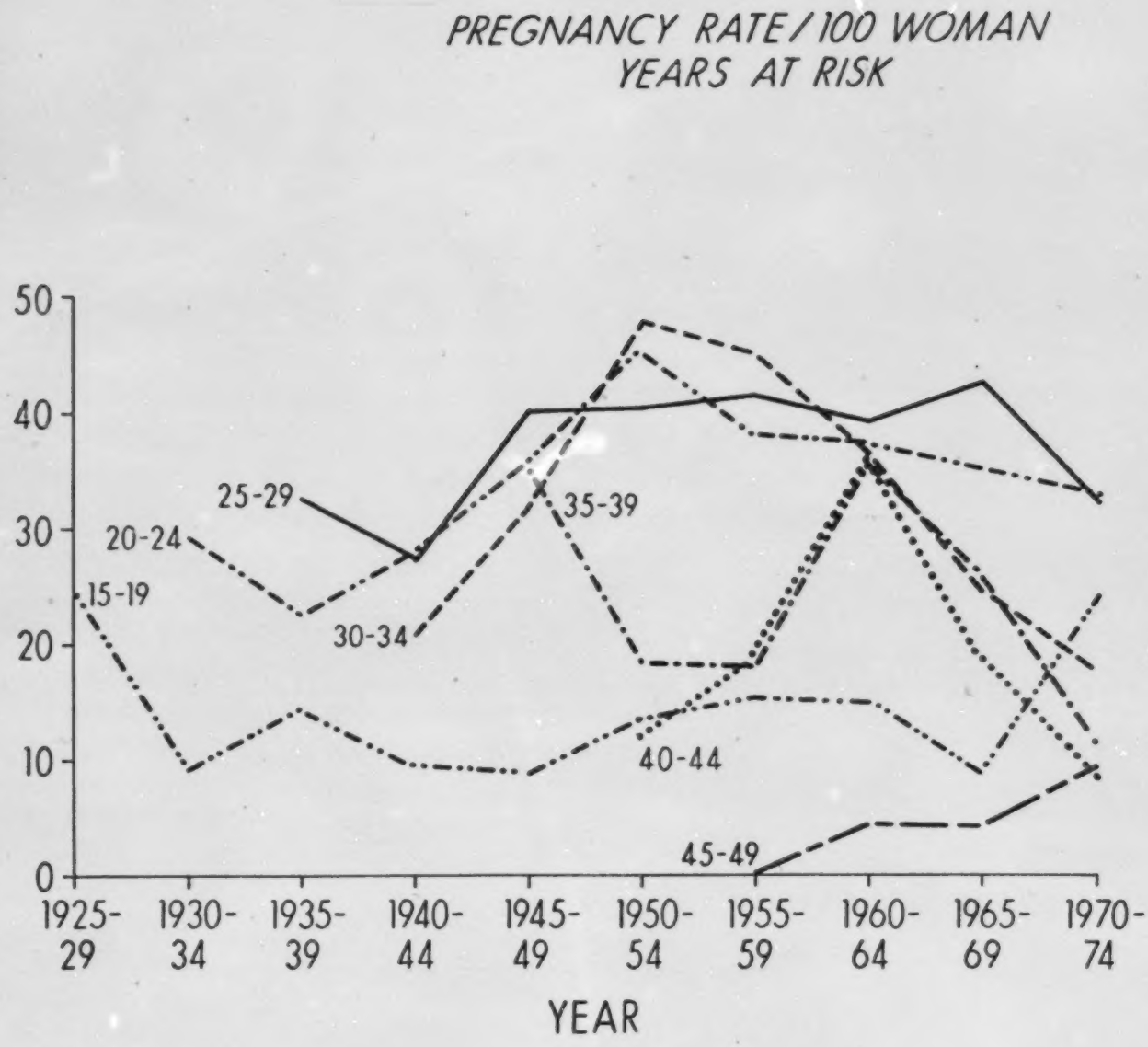

Figure 3: Age-Specific Pregnancy Rates for Women of Different Ages, 1925-1974

The curve in Figure 2 was produced by (1) adding the number of woman-years at risk in all age groups between 15 and 49 within 5-year intervals between 1920 and 1974; (2) dividing the total number of pregnancies in the same period by that number; and (3) multiplying by 100. The result is misleading in a sense because the further back one goes in time, the fewer women in the older age groups is one likely to find. For example, we have no data on women in the 40-45 group from 1920. It is possible that older women at that time were less fecund and had lower pregnancy rates than did those women from the same period for whom we do have data. Thus, the curve for total pregnancy may be skewed upward by this lack of data.

In Figure 3, therefore, we have decomposed the curve into components for women of different ages. Notice that for age group 15-19 we have data from 1925 to present; for 20-24 we have data from 1930 to the present; for the age group 25-29, the data begin in 1935-39; for age group 30-34, 1940-44; and so on. The calculations are made for periods in which we have data for 10 or more women.

From Figure 3 we can see that the increase in total pregnancies in the early 1960s is a product of increased pregnancies among women 35 and older. Through the decade of the 1950s, rates for the older age groups remained essentially constant and declined slightly for the younger groups. In the early 1960s, pregnancy rates suddenly increased in the older age groups and then began to decrease. The younger groups maintained a more or less steady decline, except for the 15-19 age group that experienced a sudden increase in pregnancy rate in the early 1970s. That apparent increase is overwhelmed by the general decline in pregnancy rates in the older groups; it is probably spurious and the result of the sampling bias described previously.

Cohort Analysis

In the above analysis, we examined the same age groups at different periods; 15- to 19-year-olds in 1940-44 and 1960-64, for instance. Thus, the membership of each group changed but the age group remained constant. In cohort analysis the membership is held constant and the ages vary, that is, groups of women are followed through time. Referring to Appendix II, we obtain cohort data by starting at the upper left corner and reading diagonally toward the lower right corner of each table, from the time a group of women enters its childbearing years to the time it finishes or the study terminates, whichever comes first.

We have used the data in Table II-3 of Appendix II for women who entered their childbearing years in 1925 or later. Again, the rates are calculated in 5-year intervals. Hence, the first cohort is made up of women entering the 15-19 age group in 1925-29; the second in 1930-34; and so on. Notice that up through the cohort beginning in 1940-44, we have the complete fertility experience, whereas for subsequent cohorts the data are truncated at younger and younger ages.

Figure 4 shows the age-specific pregnancy curves for the four oldest cohorts. It is clear that the two oldest cohorts had lower pregnancy rates at virtually every age than did the two younger ones. That is, women who entered their childbearing years between 1925 and 1934 had lower pregnancy rates than did those who entered between 1935 and 1944.

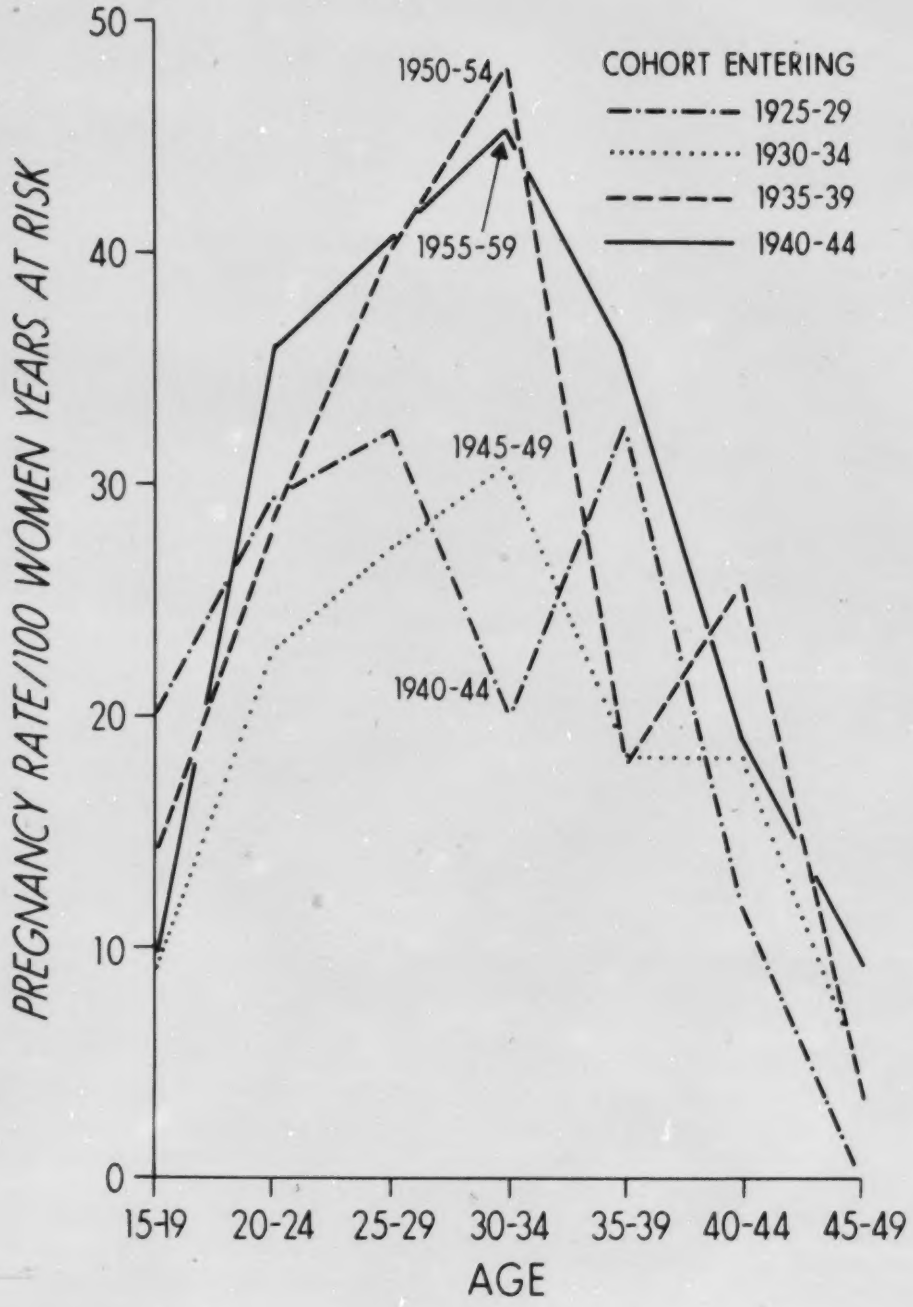

Figure 4: Age-Specific Pregnancy Rates by Cohorts, 1925-1944

It was the two earlier cohorts whose most fecund years occurred during the period of Depression, stock reduction, and war. Thus, their fertility during their younger years was much lower than that of the two later cohorts whose most fecund years occurred primarily after World War II. Notice too that women who began their childbearing years in the period 1935-39 had lower pregnancy rates than those who began in 1940-44. This last group tends to have the greatest overall fertility of the cohorts so far considered.

It should also be pointed out that the three youngest cohorts (1930-34, 1935-39, 1940-44) all had their peak fertility when they reached the age group 30-34 in 1945-49, 1950-54, and 1955-59 respectively. The oldest cohort (the one entering childbearing in 1925-29) experienced a precipitous drop when it reached age 30-34, at a time precisely during the war years 1940-44. There is thus some reason to believe that peak ages for childbearing were generally the early 30s, except during very unusual times.

In Figure 5 curves are presented for the cohorts beginning childbearing since the war. For purposes of comparison, we have included the curve for the 1940-44 cohort as well. There are two points especially worth noting. First, it is clear that peak fertility is now occurring earlier than it did in the past, and that childbearing is terminating increasingly rapidly among women after their mid-20s. Second, not only is the peak age of fertility occurring earlier, but the fertility rates are lower.

It must be pointed out that at first glance the results just described do not agree with those reported by Morgan (1973: 292) from the Ramah population of Navajos on the eastern side of the reservation. His data are presented as average annual crude birth rates in 5-year intervals from 1890 through 1964. The rates per 1,000 population for the years relevant to this discussion are as follows: 1920-24, 49.9; 1925-29, 41.1; 1930-34, 45.3; 1935-39, 51.2; 1940-44, 51.5; 1945-49, 45.0; 1950-54, 41.9; 1955-59, 41.1; 1960-64, 40.7. It is clear that the rates remained high through the 1930s and early 1940s and began to decline in the expected fashion in the years following World War II. This trend is similar to what has been described elsewhere for the Navajo Tribe generally (Kunitz, 1973).

There are at least two possible explanations of this discrepancy between the data from the eastern and western ends of the Reservation. First, the Ramah population may not have been as profoundly influenced by the economic changes of the Depression years. This hypothesis seems unlikely, as Ramah is an area where Navajos have been much more intimately in contact with larger society than has the population of the west, and this was true in the 1930s as well (Kunitz, in press).

Second, the discrepancy may arise from the fact that age-specific birth rates by cohort are not presented in Morgan's publication. It is possible that continued frequent childbearing by older women in the 1930s may have worked to keep the crude birth rate high even in the face of reduced fertility on the part of younger women. A particularly important consideration is that the Ramah population was rather small in the 1930s, numbering between 380 and 520. Thus, variations in the number of women at different ages in the childbearing years may have meant that the influence of reduced fertility of younger women (below the age of

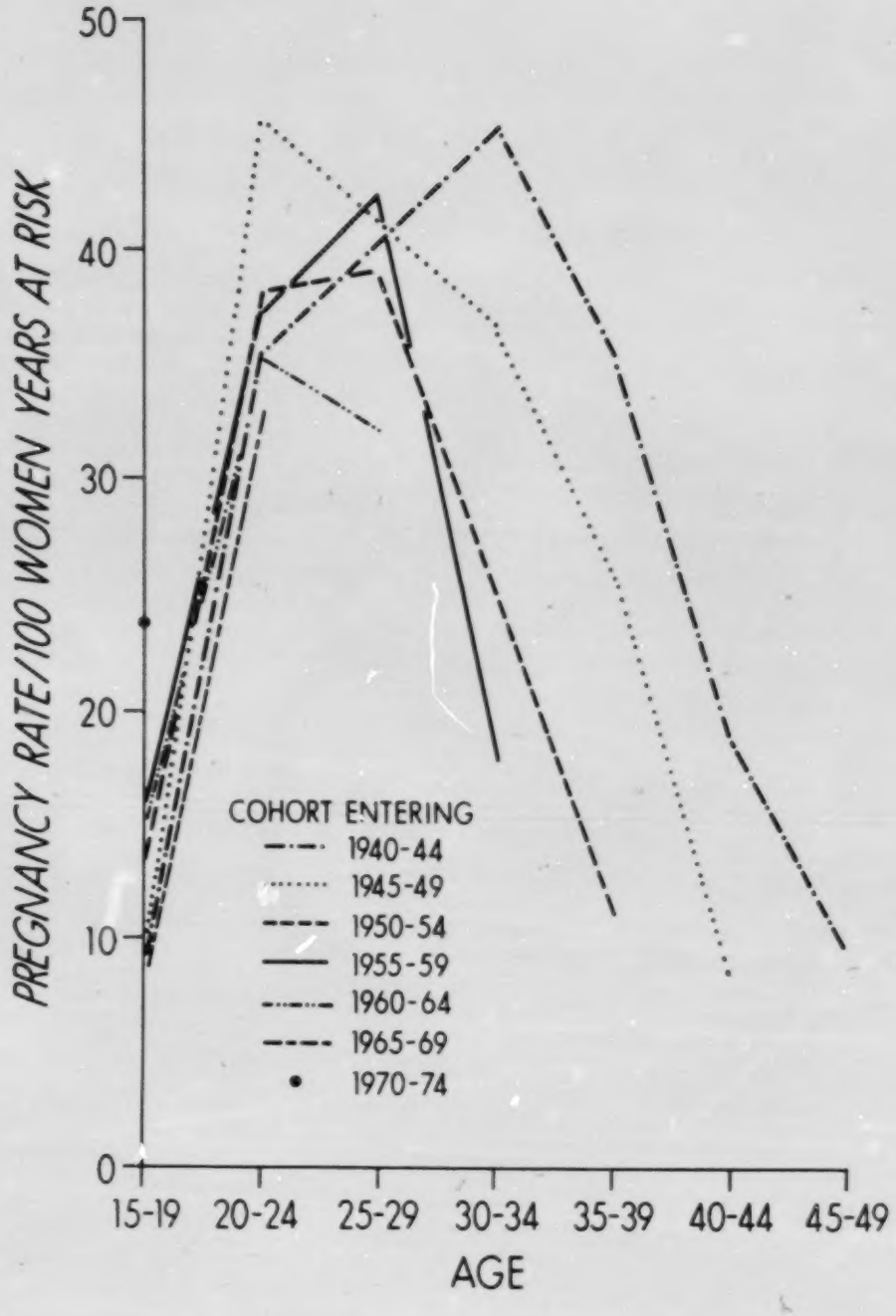

Figure 5: Age-Specific Pregnancy Rates by Cohorts, 1940-1974

30, for example) would have been overwhelmed by continuing high fertility of a few older women.

Completed Fertility

It has been shown that cohorts of Navajo women entering their childbearing years at different periods during the past several decades have had rather different fertility histories. We have not provided age-specific pregnancy rates for women older than those in the group that became 15 in the 1925-29 era because their numbers are too small. In Table 11, however, we have presented the average number of pregnancies for women in different age groups; all of these women were at the end of their fertile years at the time of interview.

In the second column of Table 11 we have shown the years during which each particular group of informants would have begun childbearing. Though the number of women above the age of 65 is very small, there is a generally consistent pattern. The two women who entered their childbearing years before 1915 had an average of 15.5 pregnancies each (15 for one and 16 for the other). Women who began childbearing in the 1915-1924 period had a much lower number of pregnancies, presumably reflecting the impact of the 1930s on their later childbearing years. Women who began their childbearing in the 1925-34 period had, as already noted, the lowest total fertility of any of these cohorts. The two youngest cohorts, entering in 1935 and after, experienced an increase, on the average, of 1.2 pregnancies per women from the period immediately preceding. This was not sufficient, however, to increase their completed fertility to levels achieved by the two women in the age group above 65.

These data suggest that there has been a true decrease in the number of pregnancies per woman that has been caused by a variety of factors: severe economic perturbations, increasing infant survival, and changes in social structure and educational attainments. Indeed, it seems

Table 11: Average Number of Pregnancies for Women with Completed Fertility

Age at Time of Interview (years)	Years When Women Were Age 15	Number of Women	Number of Pregnancies	Average Number of Pregnancies Per Woman
45-49	1940-44	8	74	9.3
50-54	1935-39	11	100	9.1
55-64	1925-34	10	80	8.0
65-74	1915-24	4	43	10.7
>75	Before 1915	2	31	15.5
Total		35	328	9.4

likely that the Depression and stock reduction had a major impact on fertility practices and that since the end of World War II enough changes have taken place in the reservation economy and social system that fertility has never thereafter achieved the same heights as previously. Subsequent cohorts whose fertility is not yet complete show every indication that they will have even lower average numbers of pregnancies by the time they have completed their childbearing years. This will probably be true for even the youngest (15-19) group in the sample, which has shown the very high pregnancy rates in the years 1970-74.

Education and Income

We remarked that individual characteristics probably account for many of the changes described so far, if in no other way than by making people more or less responsive to the forces exerted upon them by the larger society. Education is one such characteristic. A partial correlation between years of schooling and number of pregnancies, if age is held constant, is $r = -.28$ ($p = .001$, $N = 127$), suggesting that within a given age group, those women with more education have fewer children. The relationship is strongest for women below age 50, however, for whom $r = -.17$ ($p = .04$). For women 50 and above, $r = -.11$ ($p = .29$). These same data on eduation are displayed in a different fashion in Table 12, which is presented to facilitate discussions of ideal family size and contraceptive use. The data indicate that age and education exert independent effects on the number of pregnancies and that there is no interaction between the two.

Table 12: Mean Number of Pregnancies by Age and Education

Education (years)	Age (years) 15-29 Mean	15-29 Number	30-49 Mean	30-49 Number	50 Mean	50 Number
0	--	--	7.8	25	9.7	14
1-8	3.6	9	7.0	21	8.3	3
9-12	2.4	29	5.3	12	9.3	8
>13	1.2	6	3.3	3	--	--

Comparison	Sums of Squares	Degrees of Freedom	F	p
Interaction of education and age	32.63	6	0.19	>.05
Education effect	82.67	3	3.41	<.05
Age effect	509.52	2	31.57	<.01

Income and fertility are also closely related. In this case a partial correlation between per capita income and number of pregnancies, again holding age constant, gives an r of -.28 ($p = .003$, $N = 91$), suggesting, as with education, that the higher the income, the lower the fertility. Again, however, this is true only of women below age 50, for whom $r = -.29$ ($N = 67$, $p = .007$). The correlation is also negative but smaller for women 50 and above ($r = -.15$, $N = 20$, $p = .25$).

Finally, we remind the reader that even statistically significant results are not necessarily of major substantive significance. The square of the correlation coefficient may be interpreted "as the proportion of the total variation in the one variable explained by the other" (Blalock, 1960:298). A correlation coefficient $r = .3$, though statistically significant, means that only 9 percent of the variance is explained.

Ideal Family Size

It is generally agreed that one of the major determinants of the number of children a family will have is the number it desires. As the latter changes, so does the former. Table 13 displays the average number of children desired by women of different ages for their own and for all Navajo families.

When asked about the ideal size of all Navajo families, women in our sample above and below the age of 40 responded in marked contrast to one another. The younger group desires one or more children less than the older group. The same pattern is roughly true concerning the desired number for one's own family. Significantly, the youngest group desires for itself on the average one less child than it desires for all families. This attitude is not expressed by older women.

Table 13: Ideal Number of Children Reported by Women Interviewed

Age at Time of Interview (years)	For the Average Navajo Family	For Respondent's Own Family
15-29	6.0	5.0
30-39	5.8	6.4
40-49	7.3	7.8
>50	7.5	7.3

Because it was not clear whether we were seeing an age effect, an education effect, or an interaction between the two, a two-way analysis of variance was performed with the data cross-classified as in Tables 14 and 15. In each case note that there is an age effect and an educational effect: the younger a woman, the fewer children she is likely to want for herself and all others; and the more education she has, the smaller the number of children. Moreover, there is no interaction between the two, they are simply additive. Thus, education has been important but other factors related to age are also significant. As yet we are not able to determine what these other age-related factors are, but we suggest a few that seem to be important: changing economic opportunities; changing family structure; and differences in the relationship between husband and wife. Despite the decrease in desired family size, however, it is still true that if young women actually have the number of children they say they would like, the population of the study area will more than double within

Table 14: Average Number of Children Desired for Respondent's Family, Cross-Classified by Age and Education

Years of School Completed	Age (years)		
	15-29	30-49	50
0	--	7.2	7.4
1-8	5.4	5.7	8.0
9-12	5.2	5.8	7.1
>13	3.5	4.5	--

	Sums of Squares	Degrees of Freedom	Mean Square	F	p
Education effect	43.29	3	14.64	8.32	<.01
Age	26.94	2	13.47	7.65	<.01

Table 15: Average Number of Children Desired by Respondents for All Navajo Families: Cross-Classified by Age and Education

Years of School Completed	Age (years)		
	15-29	30-49	>50
0	--	7.1	7.7
1-8	6.2	6.4	8.0
9-12	6.1	5.6	7.3
>13	5.7	3.0	--

	Sums of Squares	Degrees of Freedom	Mean Square	F	p
Education effect	18.03	3	6.01	3.10	<.05
Age effect	19.14	2	9.57	4.93	<.02

a generation. It must be remembered of course, that our small sample is not representative of the entire population of the Navajo Reservation, but these results are comparable to those reported from interviews with 50 women from Ramah on the eastern side of the reservation in 1973 (Khattab, 1974).

The Outcome of Pregnancy

The striking improvements in Navajo maternal and perinatal mortality rates are largely the result of improved acute medical care and increasing utilization of hospitals for delivery. Table 16 presents information on the proportion of all births in hospital to women in the study. It is clear that the shift has been dramatic over the past half century. The major change took place between the 1940s and 1950s, and 100 percent of births between 1970-74 occurred in hospital.

In Table 17 we have displayed data on the survival of liveborn infants during the first year of life. There is an obvious trend toward increased survival, but the infant mortality rates we have calculated are much lower than what we would have expected on the basis of data provided elsewhere (Kunitz, in press).

It appears likely that the small numbers in our sample allow for the possibility of considerable random fluctuation which may not truly represent the magnitude of the infant mortality problem. Two other explanations are suggested. First, women may have forgotten a very large number of liveborn infants who died early. Though entirely possible, this probably does not explain all the discrepancy, inasmuch as an effort was made to account for every 2-year interval between or adjacent to reported births. A second

Table 16: Place of Live Birth

Date of Birth	Home		Hospital		Total	Unknown
	Number	Percent	Number	Percent	Number	Number
1910-29	32	100	0	0	32	2
1930-39	41	91.1	4	8.9	45	6
1940-49	55	69.6	24	30.4	79	13
1950-59	38	21.8	136	78.2	174	2
1960-69	6	2.3	253	97.7	259	2
1970-74	0	0	107	100	107	0

possibility is that we may have a somewhat biased sample in which women who have survived their childbearing years may have also been the ones who had children who also survived. This may be related to the wealth of various families and their differential ability to care for mothers and infants, particularly in the period prior to the 1940s when acute medical care was not readily available. The data do not permit us to go beyond these suggestions.

The rates calculated from our study are unusually low compared to infant mortality rates calculated by Morgan (1973: 287) for the Ramah Navajos: 1890-1909, 60 (per 1,000 live births); 1910-1924, 89; 1925-39, 141; 1940-49, 133; 1945-54, 77; 1950-59, 32; 1955-63, 43. Morgan's data suggest that infant mortality may well have increased during the Depression years, to decline again after World War II. The number of births to women in our sample is not large enough to discern such a pattern for the years prior to 1940.

Table 18 provides some information about the migratory patterns of the offspring of our informants. For those children still living at the time of our interview, place of residence was recorded. Of those between 20 and 34 years of age, only about half were still living in the Tuba City Agency. Another 7 percent were living elsewhere on the reservation, and the remainder were living off the reservation entirely. However, of the 42 young adults who were off the reservation, 24 were in nearby border towns and only 18 farther away than that. The numbers are smaller for the older age groups, and interpretation is complicated by the cyclical pattern of migration. Many of the people now in their 40s, for instance, may have lived off the reservation at some point and subsequently returned home. Thus, about all we can safely say is that at any given time 40 to 45 percent of young adults from the western end of the reservation are likely to be living off the reservation.

Discussion

It is clear from published data (Kunitz, 1973) that Navajo fertility has been declining since the end of World War II. The additional information presented

Table 17: Survival of Liveborn Infants During First Year of Life

Date of Birth	Number Liveborn[a]	Number Dying in First 6 Months	Number Dying in Second 6 Months	Proportion Surviving First 12 Months	Infant Mortality Rate		Number of Deaths	
					Observed	Expected	Observed	Expected
1910-39	84	6	1	91.7	83	250	7	21
1940-49	92	2	1	96.7	32.6	140	3	13
1950-59	175	8	1	94.9	51.4	50	9	8.7
1960-69	257	0	3	98.8	11.6	40	3	10.3
1970-73[b]	103	0	1	99.0	9.7	30	1	3.1

[a]Unknowns omitted

[b]4 liveborns in 1974 omitted

here suggests that within this overall pattern, fertility rates have been somewhat more sensitive to economic conditions than had previously been suspected. We refer specifically to the differences in fertility of women who reached their childbearing years before, during, and after the Depression, stock reduction, and World War II.

The responsiveness of this isolated population to economic perturbations, even in the absence of effective and readily available contraceptives, should not surprise us. Evidence from pre-industrial and agricultural communities in England, the United States, and France all document similar responses on the part of such populations. In the Beauvaisis in France in the late seventeenth century, for instance, fertility was inversely related to both mortality and the price of wheat: the higher the price, the higher the death rate and the lower the fertility (cited in Wrigley, 1969:66). In the first half of the nineteenth century in the United States, fertility in rural areas declined as available farm land was occupied (Forster and Tucker, 1972).

While the pattern we have reported is roughly parallel to that for the nation as a whole--a decline in fertility during the 1930s and early 1940s, a baby boom after the war, followed by a gradual decline in fertility to the present--we must emphasize that our sample may be biased in some fashion by differential survival of women from particular kinds of families. Thus, if the patterns could be reconstructed for the entire Navajo Tribe (1) it is possible that no such fluctuations in the 1930s would have been noted; and (2) it might be seen that those women who survived to the present were the ones who were better able to limit their fertility in response to shifting economic conditions. We do not believe that this is really the case because fertility of these women was in fact quite high.

Maternal mortality of Navajos in the 1930s and early 1940s was estimated to be about 1,000 per 100,000 live births

Table 18: Place of Residence of Offspring Still Alive

Date of Birth	Tuba City Agency		Reservation	Off Reservation	Total	Unknown
	Number	Percent	Number	Number	Number	Number
1910-29	15	78.9	0	4	19	1
1930-39	22	73.3	4	4	30	5
1940-53	49	50.5	6	42	97	11

(Leighton and Kluckhohn, 1947:15). For non-whites in the U.S. in 1935-39 it was 875.5 and in 1940-44 it was 773.5 per 100,000. The rates for whites were approximately half those for non-whites. In 1915-19 the rates for non-whites and whites were 1,253.5 and 700.3 respectively (Kiser et al., 1968:7). Presumably, the rate for Navajos was at least as high as that for non-whites in this same period. Thus, there is no reason to believe that Navajo maternal mortality increased dramatically in the 1930s and that the women with lower fertility at that time were more likely to survive than they were a generation previously when, as our admittedly scant data show, their fertility was much higher.

Moreover, the fact that we do not have information on older women from the 1920s and 1930s may have led us to underestimate the total pregnancy rate. If these older women had very high fertility rates, they may have served to elevate the total pregnancy rate above what we have estimated. Indeed, our eldest informants did have very high pregnancy rates, as we have already shown, and thus the total pregnancy rates probably were higher in the 1920s and 1930s than we have suggested. Whatever the total pregnancy rate, however, it does seem to be the case that pregnancy rates among women who were just beginning their childbearing careers at that time were responsive to the economic changes that were taking place.

Not only may differences in survival be a confounding factor, but it appears likely that differences in wealth during the 1930s would have been related to differences in fertility reduction. The owners of large flocks were those most affected by stock reduction (Aberle, 1966), and it is reasonable to hypothesize that they would have been the ones to reduce their fertility most markedly at that time. Unfortunately, our evidence is not sufficient to explore this possibility.

Despite the fact that the very youngest women in our sample appear to have higher pregnancy rates than expected when compared to the entire Tuba City Agency population, there is still evidence that fertility is declining in these age groups. Not only is fertility declining, but desired family size is also. The group that stands out as most aberrant, those aged 15-19 in the years 1970-74, is hard to explain. We must emphasize, however, that we do not believe this small group represents the total population of

15- to 19-year-olds on the western end of the reservation, much less the entire Navajo Reservation.

Finally, we should mention an alternate hypothesis suggested by Khattab (1974), based upon work by Polgar (1972). It is proposed that fertility among Navajos is related to the roles women play in the society at different times. In the pre-reservation period, women are said to have had very important roles outside the home. It is argued that since the reservation period began in 1868, the woman's role has been increasingly restricted to the home, and thus women tend to want more children as a means of fulfilling themselves. If this is the case, then we would expect to see an increase in fertility up to the present. Khattab (1974) does not present data showing such an increase, and our own material presented above, as well as Morgan's (1973), does not support such an hypothesis.

In general, despite the limitations of sampling and interviewing, a rather consistent pattern has emerged of (1) declining fertility presumably in response to worsening economic conditions; (2) a decrease in desired family size among young women; (3) a tendency for fertility to reach its peak at younger ages and to be lower in successively younger cohorts; (4) an inverse relationship between fertility on the one hand and education and income on the other; and (5) a tendency for educational attainment to be positively associated with later age of first marriage and first pregnancy. These last-mentioned changes have not been really dramatic because of the generally low levels of education among Navajos. Thus, the changes in fertility reported in Part 3 have occurred without much change in age at marriage. The conclusion would seem to be that postponement of marriage has not been a significant factor in reducing fertility and that other factors are of primary importance. We consider some of these in Part 4.

PART 4: CONTRACEPTIVE USE

Introduction

A considerable amount is known about maternal health and family planning among Navajos. We know, for instance, that (1) several methods of contraception were known (Hrdlicka, 1908) but were not widely used in the past except when the mother's health was in danger (Bailey, 1950:23); (2) Navajo woman are not particularly effective users of oral or intrauterine contraception at present (Wallach et al., 1967; Bollinger et al., 1970; Slocumb et al., 1975); (3) ineffective use is related more to personal and social factors than to medical complications (Slocumb et al., in preparation); (4) the use of surgical means for preventing or terminating pregnancy is relatively uncommon (Kunitz and Slocumb, 1976); (5) there is relatively little discussion of family planning between spouses (Doran, 1972); and (6) maternal morbidity and mortality, while still high, have declined dramatically in recent years (Slocumb and Kunitz, in press). In this section we describe in some detail the patterns of use of contraception in the interviewed population and some of the patterns of influence and family organization that seem to be important.

Results

Table 19 indicates that there is essentially no difference between women above and below the age of 30 in the prevalence of contraceptive use. Contrary to our results from the survey of

Table 19: Current Use Status of Contraceptives[a]

Age (years)	User		Non-User		Total
	Number	Percent	Number	Percent	Number
<30	14	31.8	30	68.2	44
30-49	26	41.9	36	58.1	62
>50	9[b]	23.1	20	76.9	26
Total	46	34.8	86	65.2	132

[a] X_1^2 (<30 vs. 30-49) = 1.26; p > .05

[b] Includes 2 women with hysterectomies

contraceptive users in the Fort Defiance family planning program, data in Table 20 indicate that there is a tendency among users among our respondents to differ by age in terms of the method for choice of contraception. Young women use pills and intrauterine devices (IUDs) about equally whereas older women tend to use IUDs (X^2 = 3.8, p = .05). Because the numbers are so small, it is hard to be certain that this is a substantively significant finding, but it is congruent with what has been observed in other populations (Slocumb et al., 1975).

In comparing the proportions of users by age and educational levels in Table 21, we are again unfortunately limited by our small sample size. Notice nonetheless that the prevalence of use generally appears to increase as education increases, with the exception of older women with no education who seem to have the highest rate of present use.

The data for women below the age of 50 in the first part of Table 21 have been rearranged and analyzed by the chi-squared test. The proportions of contraceptive users in each age and educational group do not differ significantly. Thus, young women at all educational levels are as likely as are older women to be practicing contraception, despite the fact that they have not yet achieved the same high fertility as older women. Moreover, it will be recalled that the young women in our sample have a higher fertility rate than we would have expected on the basis of data from the total population. Thus, contraceptive use among young women reservation-wide is probably considerably higher than it is in our sample.

Another way to examine these data is simply to compare users and non-users below the age of 50 in terms of several different parameters. This is done in Table 22 for the following variables: age, education, number of pregnancies, per capita income, proportion of income earned, amount of livestock owned, and length of time since last pregnancy. Notice that there is a significant difference between the groups only in terms of proportion

Table 20: Method Currently in Use[a]

Age (years)	None		Navajo		IUD		Pills		Hysterectomy		Total
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number
<30	29	69.0	0	0	7	16.7	6	14.3	0	0	42
30-49	36	58.1	0	0	18	29.0	2	3.2	6	9.7	62
>50	20	76.9	2	7.7	0	0	0	0	4	15.4	26
Total	85	65.4	2	1.5	25	19.2	8	6.2	10	7.7	130

[a] X_1^2 (pill vs. intrauterine devices <30 vs. 30-49) = 3.8; p = .05

Table 21: Age and Education of Contraceptive Users

Years of Education	Proportion of Women Using Contraception by Age		
	<30	30-49	>50
0	--	56% (14/25)	15.3% (2/13)
1-8	25% (2/8)	23.8% (5/21)	0% (0/3)
9-12	27.6% (8/29)	50% (6/12)	12.5% (1/8)
>13	66.6% (4/6)	25% (1/4)	--

Chi-Square Analysis[a]

Education	0 years	1-8 years		>9 years	
Age	30-49	<30	30-49	<30	30-49
Users	14	2	5	12	7
Non-users	11	6	16	23	9
Total	25	8	21	35	16

[a] $X^2_4 = 6.2$; $p > .05$

Table 22: Comparisons of Contraceptive Users and Non-Users Below the Age of 50

Variable	User Number	Non-User Number	t-value	p-value
Per capita income	9	36	0.79	.21
Education	14	69	1.38	.085
Age	14	69	-1.03	.152
Number of pregnancies	13	67	-0.81	.210
Length of time since last pregnancy	22	41	0.76	.450
Proportion of income from wages	9	36	1.83	.05

of income earned, which is higher for the users.

The question regarding current use yields information about the prevalence at time of interview, but tells us nothing about previous use. In Table 23, therefore, we have presented the responses to another question that concerns previous contraceptive use. For all groups, the women currently using contraception represent most of the women who have ever tried to prevent pregnancy: 14 out of 19 women below age 30; 26 out of 34 women between 30 and 49; and 4 out of 5 women aged 50 and above. The differences between women below age 30 and those aged 30-49 are not significant, but the proportions who have tried to limit fertility differ significantly above and below age 50.

Table 23: Answers to Question, "Ever Try To Prevent Pregnancy?"

Age (years)	Answer: Yes #	Yes %	No #	No %	Total #
<30	19	43.2	25	56.8	44
30-49	34	55.7	27	44.3	61
>50	5	18.5	22	81.5	27
Total	58	43.9	74	56.1	132

= number
% = percent

Chi-Square Analysis

Comparison	Degrees of Freedom	X^2	p
<30 vs. 30-49	1	1.14	>.05
<50 vs. >50	1	7.65	<.01

At the same time, the fact that fertility has fluctuated in the past suggests that women over age 50 may not have been entirely candid in their denials of attempts to avoid pregnancy. This is reinforced by the fact that the majority of women currently not using contraception had some knowledge of at least one method and that there were no significant differences between age groups, as indicated in Table 24. Thus, as in many other populations, the failure to use contraception cannot be related entirely to the lack of knowledge of its existence. Moreover, the denial of its use cannot be taken entirely at face value when fertility histories indicate both considerable responsiveness of birth rates to economic changes as well as levels of childbearing below the maximum biological limit.

For women not using contraception, there was little adequate information on the source of knowledge. Thus in Table 25, data concerning the sources of knowledge of contraception are shown only for those currently using contraception.

The vast majority of women in the sample, almost 90 percent, reported learning about contraception from some agency representative rather than from a family member or friend. The only exceptions are a few young women. This is perhaps not surprising, except that in a kin-based society where much health information is discussed in the family (Levy, 1962b), we thought that perhaps contraceptive knowledge would be also. Instead, it appears that there is little discussion of this topic and that information about contraception, rather than spreading in

Table 24: Knowledge of Methods by Non-Users[a]

Age (years)	Number of Methods Known				Total
	0		1-8		
	Number	Percent	Number	Percent	Number
<30	1	3.8	26	96.2	27
30-49	7	25.0	21	75.0	28
>50	5	25.0	15	75.0	20
Total	13	17.3	62	82.7	75

[a] $X_2^2 = 5.45$; $p > .05$

Table 25: Source of Information for Contraceptive Method Currently Being Used[a]

Source	<30	30-49	>50	Total Number	Total Percent
PHS personnel	10	23	1	34	89.4
Family member	0	0	0	0	0
Other women	1	0	0	1	2.6
Husband or boyfriend	1	0	0	1	2.6
Friend	1	0	0	1	2.6
School	1	0	0	1	2.6
Total	14	23	1	38	99.8

[a] minus unknowns

a snowball fashion from influential cosmopolitans to others, tends to go no further than the woman first contacted (Rogers, 1973:63).

Though information is derived primarily from professionals rather than from kin or friends, it is reasonable to suppose that some influence from the latter category of people would be significant. Particularly in a matrilocal society, mothers' opinions might be important. Table 26 displays the impressions of the informants concerning the opinions of their mothers regarding the use of family planning methods. It is evident that mothers' opinions are essentially unrelated to whether a woman is or is not using contraception (there is no difference between age groups above and below 30).

On the other hand, Table 27 suggests that the support of husbands is associated with the current user status, though for women 30-49 it is striking how many women are using contraception despite the disapproval of their husbands.

Table 26: Mother's Attitudes Towards Family Planning for Respondents Below Age 50[a]

Mother's Attitude	Respondent's Contraceptive Use		
	Using	Not Using	Total
Pro	6	6	12
Con	6	19	25
Doesn't know or care	23	36	59
Total	35	61	96

[a] $X_2^2 = 2.77$; $p > .05$

Women in the sample were asked simply whether or not anyone had influenced their use or non-use of contraception; their replies are reported in Table 28. Younger women are significantly more likely than are older women to admit being influenced by others.

Not only are young women more likely to admit being influenced, but when they are influenced (Table 29), they are more likely than are other young women and all older women to be contraceptive users. It seems reasonable to infer that young women more frequently engage in discussions of contraceptive use and are influenced by the discussions in which they participate.

We have already pointed out that mothers' opinions appear to be unrelated to the use of contraception, but that husbands' opinions are so related. Thus, we see in Table 30 that all women using contraceptives who say they were influenced to do so have husbands who supported contraceptive use. On the other hand, of those users who say they were uninfluenced, only about one-third of their husbands favored the use of contraceptives.

One of the major deficiencies of our study is the lack of data from interviews with husbands and/or boyfriends. We cannot tell, therefore, what the determinants are of their attitudes towards contraceptive use. We did think, however, that older women whose husbands favored contraception would have had more pregnancies than those whose husbands were opposed; our hypothesis being that the more children one had, the more likely would the husband be to want no more. Husbands'

Table 27: Husbands' Attitudes Towards Contraception

Husbands' Attitudes	Respondents' Contraceptive Use by Age					
	Using			Not Using		
	<30	30-49	Total	<30	30-49	Total
Pro	8	11	19	5	1	6
Con	0	7	7	4	10	14
Doesn't know or care	6	4	10	21	7	28

Chi-Square Analysis

Comparison	Degrees of Freedom	X^2	p
Total users vs. non-users	2	16.27	<.001
Users: <30 vs. 30-49	2	6.21	<.05
Non-users: <30 vs. 30-49	2	9.86	<.01
Users <30 vs. non-users <30	2	8.5	<.02
Users 30-49 vs. non-users 30-49	2	9.2	<.01

Table 28: Influence Perceived by Respondent Concerning Contraceptive Use[a]

	Age				Total
	<30		30-49		
	Number	Percent	Number	Percent	Number
Respondent was influenced	10	71.4	4	28.6	14
Respondent was not influenced	29	36.3	51	63.7	80
Total	39	41.5	55	58.5	94

[a] $X_1^2 = 4.7$; $p < .05$

Table 29: Contraceptive Use and Admitted Influence

	Age					
	Using			Not Using		
Admits Influence	<30	30-49	Total	<30	30-49	Total
Yes	6	2	8	4	2	6
No	3	21	24	25	30	55
Unknown	5	3	8	1	4	5
Total	14	26	40	30	36	66

Chi-Square Analysis

Comparison[a]	x^2	Degrees of Freedom	p
Users vs. non-users (total)	2.68	1	>.05
Users vs. non-users (<30)	7.36	1	<.01
Users vs. non-users (30-49)	0.03	1	>.05
Users, 30 vs. 30-49	8.70	1	<.01
Non-users, 30 vs. 30-49	0.31	1	>.05

[a]Unknowns not included

Table 30: Husbands' Influence on Contraceptive Users[a]

	Husbands' Attitudes			
Admits Influence	Pro	Con	Don't Know or Care	Total
Yes	8	0	0	8
No	10	8	10	28
Unknown	1	1	6	8

[a] $X_1^2 = 10.2$; $p < .01$

attitudes are compared to average number of pregnancies in Table 31.

For women below 30, there was no difference in the husband's approval or disapproval related to the women's average number of pregnancies. For women aged 30-49, the results were the reverse of those we had expected. Women whose husbands favored contraception had on the average one less pregnancy than women whose husbands felt otherwise. There is, therefore, an indication that approval of contraceptive use does not necessarily increase when women have reached their limit in terms of childbearing; that is, husbands do not seem to increase their approval only as a result of having many children. Approval also seems to antedate the accomplishment of high fertility and is presumably based on some notion of desired family size, and possibly on a variety of other factors that we are as yet in no position to explain. Finally, it is clear that husbands of young informants are less likely to be opposed to the use of contraception than are husbands of older informants. Husbands of younger women are more likely to either favor or be indifferent to the use of contracption.

Table 31: Husbands' Attitudes Compared to Respondents' Average Number of Pregnancies[a]

Husbands' Attitude Toward Contraception	Age of Respondents	
	Below 30	30-49
Favorable	2.6 (N = 13)	6.6 (N = 13)
Opposed	2.5 (N = 4)	7.5 (N = 17)
Doesn't Care	2.3 (N = 16)	7.2 (N = 10)

[a]Numbers in the body of the table represent mean number of pregnancies; numbers in parentheses represent number of respondents for whom mean was calculated

So far, we have been able to show that there is a tendency for young women to be more likely to admit being influenced in their use of contraceptives than older women. We have also shown that there is an association between the use of contraception and the support of husbands. Many of those women for whom there is an association, however, deny that the husband or anyone else had any influence on their decision. Moreover, among those women who were contraceptive users, most (90 percent) indicated that they had learned whatever they knew from Indian Health Service personnel rather than from non-professionals, thus suggesting that the diffusion of knowledge and influence in this population was primarily a one-step process from the health-care providers to the clients.

It is possible, however, that our respondents were themselves influentials from whom information spread to other women not in our sample. They may have been the innovators influencing other Navajo women, rather than those who were influenced by other Navajo women. To resolve this issue, we asked respondents whether they thought they had influenced others. Table 32 presents the responses to the question concerning whether or not the respondent thought she had been an influence favoring use. There is no difference among age groups and very few women thought they had influenced anyone in favor of using contraception. Of the nine women who admitted influencing someone else in favor of family planning, three said the person was a friend, five

Table 32: Influence Exerted in Favor of Contraceptive Use[a]

Influenced Others	Age of Respondent		
	<30	30-49	>50
Yes	5	4	0
No	33	52	24
Unknown	6	6	2

[a] $X_1^2 = 3.61$; $p > .05$

said the person was a family member, and for one respondent the person was not identified to the interviewer. On the other hand, only one person admitted to having influenced someone negatively.

A similar pattern of non-interference is noted when women were asked the kind of advice they would give a daughter regarding family planning. Only two women said they would actually advise a daughter against the use of contraceptives. Another one said she would suggest using it only for health reasons. On the other hand, 28 respondents said their daughters should be informed about such matters. These women were equally divided between those above and below the age of 30. Only one was above the age of 50. Likewise, they were equally divided among users and non-users. Fourteen of 46 women below the age of 30 and 13 of 63 women aged 30-49 said their daughters should be knowledgeable about family planning.

It is important, however, to describe in more detail some of the factors that impede or facilitate the spread of information concerning contraception in the population. Clearly, not all types of information diffuse in the same fashion. Students of the innovation process have pointed out that the curves of the rate of acceptance of an innovation have very different configurations depending on a variety of factors. The s-shaped curve of geometric population growth is similar to the one representing the growth of acceptance of an innovation, with one person telling several others, each of whom in turn tells several others, and so on. On the other hand, a low flat curve suggests that the pattern of communication is very restricted and does not occur in an exponential fashion. In studying the diffusion of the adoption of a new antibiotic among physicians, Coleman et al. (1966) showed that two curves could be described depending on the characteristics of the physicians. Those who were firmly embedded in the medical community formed a group that had an adoption pattern over time resembling the s-shaped curve. Those physicians who were isolated had adoption rates that formed a flat, low curve.

Not only the nature of the community but the type of knowledge or innovation being diffused is significant. For instance, Rogers (1973:63) has suggested that the adoption of a "taboo" innovation follows a low flat curve and that this seems to be particularly true of contraceptive methods as opposed, for instance, to the use of hybrid corn among farmers.

In Appendix III we have provided data on new adopters of contraception among American Indians and Alaska Natives. We also explain the methods used to make the calculations of the figures in the last column of the table in the Appendix, which lists the number of new adopters per 1,000 women at risk. Notice that after the first 2 years of the program, the rate of

new adopters per 1,000 women aged 15-44 has remained essentially constant. Even the rapid rise up until 1967 may be somewhat misleading, because we had to assume for the purposes of our computations that no women had been using contraception before fiscal year 1965. This is almost certainly an oversimplification because fertility rates in some tribes have been declining since the 1940s.

A plot of these figures yields a curve that resembles the one characteristic of communication that proceeds not in a snowball fashion but rather with great difficulty through a population. A reasonable inference to draw from this comparison is that contraceptive use spreads in one step from Indian Health Service professionals to the service population at a rather constant rate as suggested above; that influence does not spread from those first recipients of contraception to other women in the population; and that the impedence to the diffusion of the acceptance of contraception is probably related both to type of innovation it represents, as well as to the kinds of communication networks and conjugal relationships that exist among most American Indian and Alaska Native populations.

Family Organization and Contraceptive Use

It is often suggested that in societies where extended families are common, fertility is higher than in societies where nuclear families are common. The assumption is that it is women within extended families who have the highest fertility. Much of the research done on this problem has been reviewed and criticized in a recent paper by Burch and Gendell (1971), and the reader is directed to their article for details. Only two points will be made here. First, many of the studies cited have used the same methods of identifying family type as we have here, that is, by residence pattern. It is clear, however, that even married couples living neolocally may have intense interaction with, and dependence upon, kin. This was certainly true of some of the urban couples interviewed by Bott (1971) in her study in London.

Second, a review of community studies on the Navajo Reservation over the past 30 years indicates that the proportion of families living in extended arrangements has not been uniformly high, while at the same time fertility rates have been among the highest of any American Indian population reported (Henderson and Levy, 1975; Kunitz, 1973). There is also some reason to believe that even neolocally organized families have considerable interaction with kin that is not adequately described when residence pattern is the sole criterion used to assess these relationships.

These considerations are important because it has been shown that: (1) conjugal relationships differ depending on the degree of interaction with kin outside the marriage (Bott, 1971); and (2) the type of conjugal relationship that exists is related (among lower class urban couples) to the ability to use contraception effectively (Rainwater, 1965).

Conjugal relationships may be defined as joint or segregated. The former refers to a marriage in which husband and wife share tasks and roles are not strictly defined. A segregated relationship is one in which roles are well defined: for instance, the husband may be the breadwinner and be uninvolved in any tasks related to homemaking activities. In general, segregated relationships are found in marriages where a dense network of kin

exists. The reverse, however, is not always the case: that is, a loose kin network does not assure a joint conjugal relationship. Bott (1971:60) has explained this pattern as follows:

> When many of the people a person knows interact with one another, that is when the person's network is close-knit, the members of his network tend to reach concensus on norms and they exert consistent informal pressure on one another to conform to the norms, to keep in touch with one another, and, if need be, to help one another. If both husband and wife come to marriage with such close-knit networks, and if conditions are such that the previous pattern of relationships is continued, the marriage will be superimposed on these pre-existing relationships, and both spouses will continue to be drawn into activities with people outside of their own elementary family (family of procreation). Each will get some emotional satisfaction from these external relationships and will be likely to demand correspondingly less of the spouse. Rigid segregation of conjugal roles will be possible because each spouse can get help from people outside.

Rainwater (1965) has shown that among urban lower class families (both black and white), those with a joint conjugal relationship are able to use contraception more effectively than those with segregated relationships. This seems to be because among couples with joint relationships communication is generally much freer and sexual compatability much more important than among couples with segregated relationships.

We may hypothesize, then, that segregated relationships will be found among couples living in close-knit kin networks, whether or not they are living in neolocal or extended camps. Furthermore, it is reasonable to suppose that among couples living in close-knit kin networks, communication about contraceptive use as well as the prevalence of use would be less than among couples in loose-knit networks.

Although we do have some measures of interaction between related households in our sample, in this analysis we will use only residence pattern as a measure of kin interaction. It is reasonable to assume that, as a group, women living in extended camps in general have closer-knit kin networks than do those living neolocally. At the same time, this dichotomy between neolocal and extended camps clearly ignores the fact that many neolocally organized families also have much interaction with kin. We have chosen in this preliminary analysis to use only the dichotomy between neolocal and extended camps, however, leaving for subsequent reports an analysis of patterns of interaction between households regardless of residence patterns.

We have displayed in Table 33 the pattern of contraceptive use of women below 30 and 30-49 depending on whether they are living in neolocal or extended camps. Notice that there is no difference between users and non-users of contraception when age groups are aggregated ($X^2 = 0.6$). When older and younger women are compared separately, however, it appears that there is no difference among the former but that among the latter the difference is significant.

Further, there is some indication that the attitudes of husbands and communication patterns differ depending on type of residence. In Table 34 we see that a woman living in an extended camp is unlikely to know what her husband thinks about contraceptive use, or to say that he is indifferent to her use or non-use.

Table 33: Use of Contraception and Camp Organization

Camp Organization	Contraceptive Use by Age					
	User			Non-User		
	<30	30-49	Total	<30	30-49	Total
Neolocal	4	11	15	5	13	18
Other	2	10	12	13	11	24

Chi-Square Analysis

Comparison	x^2	p
User vs. non-user, total	0.6	>.05
User vs. non-user, <30[a]		~.05
User vs. non-user, 30-49		>.05

[a]By Fischer's Exact Test (Siegel, 1956)

Table 34: Perceptions of Attitudes of Husbands Towards Contraceptive Use (Women Age <50)

Husband's Attitudes	Camp Organization Neolocal	Other
Pro	8	8
Con	11	9
Doesn't know or care	7	17
Mixed	2	1
Unknown	15	16
Total	43	51

These results are not very conclusive, but they do suggest that type of residence pattern is related to how much a wife knows about her husband's views of contraceptive use. Thus, in extended camps there is a somewhat greater tendency for women not to know their husbands' attitudes or to say that it is a matter of indifference. Though we have no data on the conjugal relationships of our informants, this pattern of responses seems to reflect a segregated relationship, which is what we might expect in an extended camp arrangement.

The finding that the few young women in neolocal camps are more likely than others to be using contraception, and that such a difference does not exist among older women, is suggestive and worth returning to briefly. Witherspoon (1975) has claimed that the usual Navajo marriage goes through three stages that are of varying length and are hard to demarcate, but which are roughly as follows. The first stage is the time soon after the new husband moves into the wife's parents' camp and finds himself with low status, little influence, and still with obligations to his own family of origin. This is the most volatile period and the time when divorce or separation is most likely. The second stage occurs after several years and is marked by an increase in the status and influence of the husband in the wife's parents' camp, and a decrease in his interactions with his own family. Indeed, at this point, his obligations are roughly balanced between the two. The final stage occurs when ties with the camp of origin are very tenuous and incorporation into the wife's kin group is virtually complete. In a patrilocal family the stages may be the same for the in-marrying wife.

If Witherspoon's observations are correct, then it may be that we are seeing, in the first stages of marriages (in which our youngest respondents would be found), segregated relationships if these respondents live in extended camps and--possibly--joint relationships if they live in neolocal camps. This is so because the couple in the neolocal situation may be forced to invest more in their relationship early on than they would in the extended camp situation.

This distinction is probably not significant for older women for two reasons: first, because they have had many children and are ready to use contraception; and second, because by the time they are in their 30s and 40s, their conjugal relationships are likely to have developed in the direction of being more joint than segregated. Thus, it may be easier for them to be users of contraception.

Several other points deserve mention. Navajo and Hopi marriages are said to have been unstable in past generations. This has been attributed to the matrilocal residence pattern which places the young couple in a situation of conflicting loyalties. A number of observers have claimed that in the past generation there seems to have been a decrease in divorces, and this has been attributed to the increasing frequency with which families live neolocally (Nagata, 1970; Titiev, 1944; Shepardson and Hammond, 1970).

In addition, we may speculate that the very high fertility rates of Navajo and Hopi women in their late teens and 20s are due to the fact that early in marriage their relationships are

segregated and effective contraceptive use is therefore difficult. The dramatic decline in fertility rates which we have reported for Hopi women in their late 20s and beyond, which is not matched by a similarly rapid drop among Navajo women (Kunitz, 1973), may be due to the generally high educational levels of Hopi women and an ability to use contraception more effectively when they believe they have had as many children as is desirable. It should be pointed out that an alternative but not mutually exclusive explanation has been offered by Khattab (1974). She suggests that roles for Navajo women have become much more constricted than they have for Pueblo women, thus leading Navajos to have children as a substitute for other forms of creative activity.

We offer another speculation that goes further beyond the data than anything suggested so far. A number of observers have claimed that extended family arrangements have continued to be adaptive on the Navajo Reservation because the sources of income are uncertain. The pooling of resources in a larger group than the neolocal family therefore gives some hedge against unemployment and fluctuations in the subsistence economy. But this is a double-edged sword. On the one hand, the extended family may be some protection against the vagaries of the economy. On the other hand, the conjugal relationships that develop in such a situation may be such as to make effective family planning, among young couples particularly, very difficult.

Finally, we wish to put forward an additional hypothesis. Szymanski (1974) has shown that fertility rates in socialist countries are lower than those in capitalist countries, even when levels of economic development are held constant. He has suggested that this is the case because the state has assured the security of elderly parents in less-developed socialist countries, whereas children are expected to bear this responsibility in equally undeveloped capitalist countries. But it is also possible that it is the kinship network that changes when the state assures the security of families. Thus, in less-developed capitalist nations the situation may not be too dissimilar to that found on the Navajo Reservation, with extended families acting as a device for redistributing and equalizing scarce resources. In equally undeveloped socialist countries, the state may have assumed that function with the consequence that the neolocal family becomes freed of the extended kin network. The relationship between husband and wife may then shift in such a way as to make effective family planning more likely.

It is important to recall that these are speculations that go beyond the data presented here. Nonetheless, we feel they are worthy of mention, because it is necessary to consider what the results of economic development or continued underdevelopment may be. So long as the Navajo Reservation economy is characterized by a boom-and-bust pattern, it is possible that the nature of domestic relationships will favor continued high fertility. This of course is an oversimplification, as it neglects a host of important factors such as increasing educational levels and exposure to the mass media. In a future report we will deal with these issues in greater detail and will attempt to examine kin-group interactions beyond those reflected in residence patterns.

PART 5: ATTITUDES TOWARDS FAMILY PLANNING PROGRAMS

Introduction

The purpose for which this field survey was carried out was not primarily to make recommendations for better programs, but to understand the processes by which populations change their attitudes and practices regarding fertility and family planning. A few questions were asked of informants, however, relating to attitudes towards existing programs, and the responses are reported below.

Results

Table 35 indicates that of the 136 women in our sample for whom we have data, 54.4 percent think that family planning services ought to be improved. Only 17.6 percent think they should not be improved. Notice that, in general, the younger the women, the more likely they are to favor improvements. Perhaps not surprisingly, the women with the most education are also the ones who favor improved services (Table 36).

Considering only the women below age 50, more contraceptive users than non-users think services ought to be improved. Nonetheless, almost half of the non-users also feel services ought to be improved (Table 37).

Of those who suggest improvements that ought to be made, the vast majority (64.4 percent) think that more and better information regarding family planning ought to be provided (Table 38). Others think there ought to be better accessibility of services (13.7 percent), while 12.3 percent think that contraceptives ought to be provided only when the

Table 35: Opinions Regarding Improvement of Services by Age (in percent)

	Pro	Con	No Answer	Number
<30	71.7	8.7	19.6	46
30-49	55.6	15.9	28.6	63
>50	22.2	37.0	40.7	27
Total	54.4	17.6	27.9	136

Table 36: Opinions Regarding Improvements in Services by Education (in percent)

Education (years)	Pro	Con	No Answer	Number
0	41.0	25.6	33.3	39
1-8	41.2	14.7	44.1	34
>9	72.1	14.8	13.1	61
Total	55.2	17.9	26.9	134

Table 37: Opinions of Contraceptive Users and Non-Users Below Age 50 Regarding Improved Services (in percent)

Contraceptive Use Status	Pro	Con	No Answer	Number
User	87.5	2.5	10.0	40
Non-user	48.5	19.7	31.8	66
Unknown	33.3	0	66.7	3
Total	62.4	12.8	24.8	109

Table 38: Suggested Improvements (in percent)

Greater accessibility	13.7
Separate women's clinic	2.8
Prescribe for men and single women	6.8
Give only for health reasons	12.3
More and better information	64.4
Total	100.0
Number of respondents	73

mother's health would be jeopardized by continued childbearing.

When compared by age (Table 39), those women in the sample who have suggestions concerning improved services clearly differ in what they think would be appropriate. Women 50 years of age and over generally have either no opinion or do not think improvements are needed. The few who do have suggestions tend to think that contraception should be offered only for health reasons. Women below 50 do not differ from each other but do differ from the older group: (1) a higher proportion of them offer suggestions for improvements; and (2) they generally want better information and are less concerned with using contraception only for health reasons.

There was also a tendency, not unexpected, for better educated women to want more and better information about family planning and to be less concerned than are poorly educated women about health reasons for use. It is not necessary to display this information as it closely resembles that shown in Table 39.

Of those women who opposed the improvement of family planning programs, most (7) said that it was against God's will to limit fertility. Six others said that such programs were designed to reduce the number of Navajos.

Thus, to summarize briefly, there is a general desire among interviewed women to see services improved. The single most important improvement is that more and better information be furnished. Younger, better educated women using contraceptives feel this most strongly, though many others in their childbearing years share these sentiments. Older women generally do not approve of family planning or make

Table 39: Age of Women Suggesting Improvements (in percent)

Age	No Answer	Health Reasons	Better Information	Other	Number
<30	36.9	0	43.5	19.5	46
30-49	41.3	6.3	39.7	12.7	63
>50	74.0	18.5	7.4	0	27
Total	46.3	6.6	34.5	12.6	136

no comment. Those who explicitly favor improvement generally take the conservative position that contraception should be used only for health reasons, an attitude congruent with those reported in the literature from a generation or more ago (Bailey, 1950).

The fact that many women are so desirous of information and so willing--and even pleased--to talk with our interviewers is important. Our interviewer in the studies of the family planning program at the Fort Defiance hospital on the eastern end of the reservation noticed the same response (Slocumb et al., 1975). In addition, many observers have said that Navajos are reluctant to discuss matters of a sexual nature. Certainly most of our respondents in Districts 1 and 3 denied engaging in discussions related to family planning; the same pattern was observed at the Gallup Indian Hospital (Doran, 1972); and we were told the same thing by our respondents at Fort Defiance. The picture that emerges is of a population in which discussions concerning desired family size and contraceptive use are rather uncommon and in which many women are anxious to acquire what information is available.

Clearly, however, the mere availability of information does not assure use, not to mention effective use. Support from the husband is evidently especially important, and it appears that this may be more readily forthcoming in some kinds of families than others.

At the domestic level, then, there is some evidence that many women are interested in learning more about family planning and presumably will use contraception at some time. Evidently, some men too are interested in, and supportive of, use. In general, however, the use of family planning methods is not common in this population, communication appears to be infrequent, and therefore use--when it does occur--is not very effective (Slocumb et al., 1975).

At the broader social level also there is some disagreement concerning the use of contraception. On the one hand, some individuals believe that limiting family size represents at best a mistaken notion of what is required to improve the Navajos' (and all Indians') quality of life, and at worst is genocidal in intent. On the other hand, advocates of family planning believe that only by limiting population size can Indians make a successful adaptation to the world around them.

There is much to be said for the argument that political power is related to numbers (Stucki, 1970). In Table 40 are shown the numbers of Indians and non-Indians in the six reservation counties in which the Navajo and Hopi Reservations are located. Notice that Indians in 1970 represented a majority in two of them and almost 50 percent in two more. Indeed, in several counties the Navajos now have substantial representation in county and state government. Sufficient concern was expressed by the non-Indians of Apache County, in fact, that consideration was given in the Arizona legislature in 1974 to redrawing county boundaries to separate reservation from non-reservation areas. Moreover, as these data are based upon the U.S. Census, which notoriously underenumerates Indians, they do not give a

Table 40: Indian Population of Six Reservation Counties

	Total Population	Indian Proportion of Population (percent)
San Juan, New Mexico		
1960	53,306	26.7
1970	52,517	35.1
McKinley, New Mexico		
1960	37,209	56.7
1970	43,208	61.4
Navajo, Arizona		
1960	37,994	50.9
1970	47,715	48.3
Apache, Arizona		
1960	30,438	74.8
1970	32,298	74.3
Coconino, Arizona		
1960	41,857	27.9
1970	48,326	24.8
San Juan, Utah		
1960	9,040	29.5
1970	9,606	49.3

really accurate picture of the relative sizes of the Indian and non-Indian populations.

At the same time, one must ask what major benefits in terms of economic development are likely to accrue from the control of political offices at the local level. Judging by the situation of many rural areas where Indians are not located, it would seem that in terms of basic changes not much is likely to happen. What might change is the distribution of local government jobs, treatment of Indians by the police, board-of-education hiring policies, and school curricula. None of these potential consequences is insignificant, but none would be likely to alter the basic causes of rural poverty among Indians and non-Indians alike.

On the other hand, it is equally true that limiting family size itself will not help to remove the causes of poverty and exploitation. At best it will help families increase their per capita income and diminish somewhat the competition for the scarce jobs that exist. Moreover, as some informants suggested, it may have an impact on the situation of the elderly. It happens not uncommonly that young women have children whom they leave with their mothers while they go off to school or jobs. Without the support of other helpers in the family, and with finances already dangerously low, elderly grandparents are hard-pressed to care for these youngsters. This accounts for the ambivalence expressed by some of our elderly respondents. On the one hand, they did not approve the idea of family planning, but on the other they were experiencing first hand the problems of being unable to care adequately for their young grandchildren, and they were feeling that it would have been better had their daughters avoided becoming pregnant.

In any event, the decision to offer contraceptive services to the Indian population on the same basis as they are offered to other segments of the population has already been made. The acceptance of such services is not likely to be much influenced by coercive practices of health care providers--if coercion can in fact be said to exist. It is also unlikely to be greatly influenced by the policy

pronouncements of leaders either for or against population control. It is most likely to be influenced by changes in educational level and family structure. These changes are proceeding at unequal rates across the reservation, but they have even influenced individuals in previously isolated areas such as the one in which the present survey was carried out.

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GLOSSARY

age-specific birth rate	the number of births per 1,000 (or 100) women in specified age groups, usually given in 5-year intervals starting with age 15
camp	any multihousehold residence group; the households live within shouting distance and cooperate in most subsistence and domestic activities; in our usage, the nuclear household is classed as a single household camp
chi-squared test	a test using discreet (i.e., distinct) categories to determine the significance of differences between independent groups (Siegel, 1956)
cohort	a group followed longitudinally over time
correlation coefficient (r, Pearson's r, product-moment correlation)	"This coefficient measures the amount of spread about the linear least-squares equation" (Blalock, 1960:286); i.e., it is a measure of linear relationship between two variables and varies between +1.0 and -1.0. A high positive value reflects a strong positive correlation; i.e., as the value of one variable increases, so does the value of the second. A high negative correlation reflects an inverse relationship; i.e., as the value of one variable increases, the value of the

other decreases. A low value of r means the variables have no (linear) relationship

degrees of freedom — the number of independent comparisons that can be made between the members of a sample

Fischer Exact Test — a technique for analyzing discrete data (either nominal or ordinal) when the two independent samples are small in size (Siegel, 1956:96)

household — set of individuals, usually related, who live under the same roof and share resources; the composition of the household can be quite varied

Kruskal-Wallis one-way analysis of variance by ranks — a test using ranked (ordinal) data for deciding whether several independent samples are from different populations (Siegel, 1956:184)

patrilineal — referring to the transmission of authority, inheritance, or descent primarily through females

matrilocal residence — requires the groom to leave the household of his parents and to take up residence in or near the household of the bride's parents

matrilocal camp — a multihousehold residence group composed of a senior parent couple and their unmarried offspring and one or more households formed by this couple's married daughters, their spouses, and dependent children

mixed camps — residence groups which include a combination of matrilocal and patrilocal camps

N — number

neolocal residence — refers to a married couple establishing a household which is independent of and at some distance from the parents of either spouse

outfit — refers to a number of camps which cooperate in such larger subsistence activities as shearing and gelding and in conducting the larger religious ceremonies; these camps are usually related matrilineally. These larger kin groupings are thought to no longer exist in most areas of the reservation

p	see significance level
partial correlation	a correlation (r) between two variables while adjusting for the effects of additional variables (Blalock, 1960: 329-333)
patrilocal residence	requires the bride to leave the household of her parents and to take up residence in or near the household of the groom's parents
patrilocal camp	same as matrilocal camp except that it is the sons and their wives who live with the senior parent couple
perinatal	refers to the time period immediately preceding and following birth; various intervals are used in calculating perinatal mortality rates: (1) from the twentieth week of gestation to the twenty-eighth day of infancy; or (2) from the twenty-eighth week of gestation to the seventh day of infancy
r	a correlation; see also correlation coefficient and partial correlation
residence group	see household, matrilocal camp, patrilocal camp, mixed camps, outfit
residence pattern	usually refers to preferred post-nuptial residence but in most studies of Navajo refers to where a couple is living at the time of interview. (See also neolocal, matrilocal, uxorilocal, patrilocal, and virilocal residence.)
significance level (p-value)	a measure of whether the observed result of a statistical test of significance should be considered extreme; the probability of observing a value of the test statistics more extreme than the observed result, assuming the null hypothesis is true (small values of the p-value are considered extreme)
uxorilocal residence	similar to matrilocal except that the couple establishes residence with or near the bride's mother's kin
virilocal residence	similar to patrilocal except that the couple establishes residence in or near the groom's father's kin

woman-years	the total number of women who are alive in a particular year or years; may be calculated for women in different age groups as well	x^2	the quantity which is calculated from the data when a chi-squared test is performed
		x_1^2, x_2^2, x_3^2	chi-square with 1, 2, and 3 degrees of freedom respectively

APPENDIX I

FERTILITY QUESTIONNAIRE

APPENDIX I

LPRP EPIDEMIOLOGY

Fertility Interview

Date of Interview _____
Interviewer _____

Respondent's name _____
Camp number _____
Household number _____
Individual number _____
Sample group _____

I. Personal Data

1. Date of birth (month, day, year) _____
2. Age at time of interview _____
3. Sex (circle one): male female
4. Number of years of school completed _____
5. Present occupation _____
6. Present marital status (circle one): single single living with boyfriend married divorced separated widowed married but spouse away temporarily

II. Marital History

1. How many times have you been married? (If never married, go to Part III)
2. Will you please tell me about each of your marriages?
(Interviewer, gather this information for each marriage starting with the first and concluding with the present one.)

1st marriage:

a) spouse's name _____
b) your age at time of marriage _____
c) spouse's approximate age at time of marriage _____
d) duration of marriage _____
(If possible, give dates of beginning and end of marriage)
e) reason for divorce (beating, drinking, running around, etc.)

2nd marriage:

a)
b)
c)
d)

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3rd marriage:

a)

b)

c)

d)

4th marriage

a)

b)

c)

d)

(For additional marriages, use back of page)

III. Pregnancy History

Now I would like to ask you some questions about your pregnancies and children. (Interviewer, start by asking, "Have you ever been pregnant?" Yes _____ No _____ and if yes, then ask about number of living children and copy census card when possible. If never pregnant, go to Part IV.) Complete pregnancy history chart, page 3 [page 61, this bulletin]. Start with all living children to provide a time frame to help you place deceased children, still births, etc.

PREGNANCY HISTORY

Pregnancy	TYPE OF BIRTH LB=live born SA=miscarriage IA=induced abortion SB=stillborn	Name of the child (if live born)	Sex	Is the child still living?	DATE OF BIRTH OR PREGNANCY LOSS		FOR EACH CHILD BORN ALIVE NOW DECEASED			FOR EACH ABORTION OR MISCARRIAGE OR STILLBIRTH: In which month of pregnancy did you lose this child?	Where was each child born? (home, or other, hospital?)	Name of Father
							Date of birth		Age when death occurred (in months if less than one year)			
					Month or Season	Year	Month or Season	Year				
1												
2												
3												
4												
5												

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IV. Knowledge of Contraception

1. Did you or your spouse ever try to keep from getting pregnant? (circle one)
   yes no (If no, go to #7. Probe for information if there are any intervals between children or pregnancies of more than 2 years.)
2. If yes, what methods(s) did you use?
   a) Navajo methods
   b) loop (IUD)
   c) pill
   d) condom
   e) withdrawal
   f) abstinence
   g) other(s) _____
   _____
   _____
3. Are you currently using any method to keep from getting pregnant? (circle one)
   yes no
4. If yes, which one?
5. If no, why not?
6. For each method:
   from whom learned (relationship) where obtained
   a)
   b)
   c)
   d)
7. If answer to question 1 was "no":
   a) Do you know what contraceptive methods there are?
   b) What are your reasons for not using:
      Navajo methods
      Pill
      IUD
      Other(s)
8. Can you describe how your family and friends feel about the use of family planning methods?
   a) Mother:
   b) Husband(s) or boyfriend:
   c) Mother's sister(s):
   d) Others:
9. Have they influenced your ideas about using any kind of family planning methods?
   If yes, who? _____

10. Have you ever persuaded anyone to use family planning? (circle one) yes no
    If yes, go to #11
    If no, go to #12
11. If yes, who was that person(s)? (give relationship to respondent)
    Why did you feel she should use family planning?

12. Have you ever told anyone not to use family planning? (circle one) yes no
13. If yes, who was that person(s)? (relationship to respondent)
    and why did you think she shouldn't use it?

14. What do you think is the best number of children for the average Navajo family?

15. What is the best number for your own family?

16. What would you tell a daughter about to be married about the number of children you think she should have?

17. What about family planning methods?

IV. Comments on Family Planning Services:

1. Do you think family planning programs for the Navajo people should be improved?

2. If yes, what suggestions do you have?

3. If no, why not?

APPENDIX II

Table II-1: Woman-Years at Risk of Pregnancy, 1895-1974
Table II-2: Number of Pregnancies
Table II-3: Age-Specific Pregnancy Rates

Table II-1: Woman-Years at Risk of Pregnancy, 1895-1974[a]

Time Period	Age (years)										
	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60+
1895-1899	1 (1)										
1900-1904	8 (2)	1 (1)									
1905-1909	1 (1)	8 (2)	1 (1)								
1910-1914	5 (1)	1 (1)	8 (2)	1 (1)							
1915-1919	10 (4)	5 (1)	1 (1)	8 (2)	1 (1)						
1920-1924	34 (10)	10 (4)	5 (1)	1 (1)	8 (2)	1 (1)					
1925-1929	22 (11)	34 (10)	10 (4)	5 (1)	1 (1)	8 (2)	1 (1)				
1930-1934	50 (16)	22 (11)	34 (10)	10 (4)	5 (1)	1 (1)	8 (2)	1 (1)			
1935-1939	42 (16)	50 (16)	22 (11)	34 (10)	10 (4)	5 (1)	1 (1)	8 (2)	1 (1)		
1940-1944	46 (19)	42 (16)	50 (16)	22 (11)	34 (10)	10 (4)	5 (1)	1 (1)	8 (2)	1 (1)	
1945-1949	97 (36)	46 (19)	42 (16)	50 (16)	22 (11)	34 (10)	10 (4)	5 (1)	1 (1)	8 (2)	1 (1)
1950-1954	118 (41)	97 (36)	46 (19)	42 (16)	50 (16)	22 (11)	34 (10)	10 (4)	5 (1)	1 (1)	8 (2)
1955-1959	93 (34)	118 (41)	97 (36)	46 (19)	42 (16)	50 (16)	22 (11)	34 (10)	10 (4)	5 (1)	1 (1)
1960-1964	112 (37)	93 (34)	118 (41)	97 (36)	46 (19)	42 (16)	50 (16)	22 (11)	34 (10)	10 (4)	5 (1)
1965-1969	46 (18)	112 (37)	93 (34)	118 (41)	97 (36)	46 (19)	42 (16)	50 (16)	22 (11)	34 (10)	10 (4)
1970-1974	0 (0)	46 (18)	112 (37)	93 (34)	118 (41)	97 (36)	46 (19)	42 (16)	50 (16)	22 (11)	34 (10)

[a]The numbers at the top of the table are the woman-years at risk, and the numbers in parentheses are the actual counts of women in each category

Table II-2: Number of Pregnancies

Time Period	Age (years)										
	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60+
1895-1899	0										
1900-1904	0	0									
1905-1909	0	0	0								
1910-1914	0	1	2	0							
1915-1919	0	1	0	3	0						
1920-1924	1	0	3	1	3	1					
1925-1929	1	7	4	0	0	8	0				
1930-1934	0	2	10	3	0	0	5	1			
1935-1939	0	7	5	11	4	2	0	4	1		
1940-1944	0	[illegible]	14	6	7	6	3	1	0	0	
1945-1949	0	4	15	20	7	12	3	2	0	0	0
1950-1954	0	13	21	17	24	4	4	0	0	0	0
1955-1959	0	18	37	19	19	9	4	0	0	0	0
1960-1964	0	14	44	38	17	15	13	1	0	0	0
1965-1969	0	10	33	50	24	12	8	2	0	0	0
1970-1974	0	11	37	30	21	11	4	4	0	0	0

Table II-3: Age-Specific Pregnancy Rates

Time Period	Age (years)										
	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60+
1895-1899	0.000										
1900-1904	0.000	0.000									
1905-1909	0.000	0.000	0.000								
1910-1914	0.000	1.000	0.250	0.000							
1915-1919	0.000	0.200	0.000	0.375	0.000						
1920-1924	0.029	0.000	0.600	1.000	0.375	1.000					
1925-1929	0.045	0.205	0.400	0.000	0.000	1.000	0.000				
1930-1934	0.000	0.090	0.294	0.300	0.000	0.000	0.625	1.000			
1935-1939	0.000	0.140	0.227	0.323	0.400	0.400	0.000	0.500	1.000		
1940-1944	0.000	0.095	0.280	0.272	0.205	0.600	0.600	1.000	0.000	0.000	
1945-1949	0.000	0.086	0.357	0.400	0.318	0.352	0.300	0.400	0.000	0.000	0.000
1950-1954	0.000	0.134	0.456	0.404	0.480	0.181	0.117	0.000	0.000	0.000	0.000
1955-1959	0.000	0.152	0.381	0.413	0.452	0.180	0.181	0.000	0.000	0.000	0.000
1960-1964	0.000	0.150	0.372	0.391	0.369	0.357	0.260	0.045	0.000	0.000	0.000
1965-1969	0.000	0.089	0.354	0.423	0.247	0.260	0.190	0.040	0.000	0.000	0.000
1970-1974	---	0.239	0.330	0.322	0.177	0.113	0.086	0.095	0.000	0.000	0.000

APPENDIX III

NEW ADOPTERS OF CONTRACEPTIVES

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APPENDIX III

The Indian Health Service (IHS) has published figures on the number of Indian women who were new contraceptive users in each year from 1965 through 1972. It was in the middle 1960s that family planning services became more generally available to Indian people (Rabeau and Reaud, 1969). Before that time federal regulations had not permitted the dispensing of advice unless medically indicated.

Table III-1 shows figures derived from the IHS (USPHS, 1974) concerning the number of new adopters each year. We have used these data to calculate the rate of new adopters each year per 1,000 women who had not used any method previously. We have done this by subtracting from one year's population figures the number of new adopters in the preceding years. The remainder then becomes the denominator (or the population at risk) for calculating the rate. We have introduced one minor correction factor. Women at all points within the childbearing-age range receive contraceptives. Each year a certain number of these women become old enough to no longer require contraception. Based on our study of one Navajo family planning program (Slocumb et al., 1975), we have estimated that in the years since family planning services were made available in the mid-1960s about 10 percent of the women who received contraceptives were above the age of 35. Thus, as a rough estimate, about one percent of the users each year pass out of the childbearing years. Therefore, to calculate the population at risk we have subtracted from the cumulative total of new adopters one percent of that number. It is the result of this subtraction that is then subtracted from the number of women aged 15-44 to give the population at risk each year. One final point is that the number of women aged 15-44 is calculated from figures presented by the IHS which include the estimated 1970 Indian population served by the IHS, the number of women aged 15-44, and the total estimated service populations for the years 1965-1972. We have calculated the number of women aged 15-44 for the years not covered by the census by assuming that they represented the same proportion of the population in all years as in the census year (19.6 percent).

Table III-1: American Indians and Alaska Natives: Rate of New Contraceptive Adopters Per 1,000 Women Who Have Never Used Before

Fiscal Year	Population	Number of Women Aged 15-44	New Users	Rate Per 1,000
1965	413,286	81,128	3,861	47.6
1966	422,609	82,958	2,779	35.2
1967	433,932	85,180	8,227	104.8
1968	442,564	86,875	6,610	91.9
1969	451,196	88,569	7,401	113.6
1970	460,004	90,298	7,458	121.1
1971	469,632	92,188	6,287	111.8
1972	479,349	94,096	5,977	114.6

Source: USPHS, 1974

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